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Final Environmental Impact Statement for North Carolina Barrier Islands Wastewater Management

(U.S.) Environmental Protection Agency
Atlanta, GA

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Final

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This Final Environmental Impact Statement (EIS) recommends a strategy for wastewater management on the barrier islands of North Carolina. This strategy provides assistance to barrier island communities in planning for wastewater management. It presents a step-by-step process that can assist facilities planners in resolving the unique problems encountered on North Carolina barrier islands and result in a cost-effective and environmentally sound management system. Communities involved in facilities planning are encouraged to use the tools developed in this EIS wherever appropriate.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV
345 COURTLAND STREET
ATLANTA, GEORGIA 30365

MAR 23 1984

TO ALL INTERESTED AGENCIES, PUBLIC GROUPS, AND CITIZENS:

Enclosed for your review and comment is the Final Environmental Impact Statement (EIS) for wastewater management on the North Carolina Barrier Islands.

This EIS was prepared in compliance with the National Environmental Policy Act and implementing Agency regulations (40 CFR Part 6, November 6, 1979). In accordance with these regulations, the Final EIS will be filed with EPA's Office of Federal Activities. Availability of the Final EIS will then be announced in the Federal Register, beginning a 30-day comment period. (The Federal Register date is the same as the date of this notice). This Agency will take no administrative action on this Final EIS until the close of the comment period.

We will appreciate your review of this document and any comments you may have. Please send all comments to E.T. Heinen, Chief, Environmental Assessment Branch at the above address.

FINAL
ENVIRONMENTAL IMPACT STATEMENT

NORTH CAROLINA BARRIER ISLANDS
WASTEWATER MANAGEMENT

prepared by
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV, ATLANTA, GEORGIA 30365

This Final Environmental Impact Statement (EIS) recommends a strategy for wastewater management on the barrier islands of North Carolina. This strategy provides assistance to barrier island communities in planning for wastewater management. It presents a step-by-step process that can assist facilities planners in resolving the unique problems encountered on North Carolina barrier islands and result in a cost-effective and environmentally sound management system. Communities involved in facilities planning are encouraged to use the tools developed in this EIS wherever appropriate.

Comments or inquiries should be forwarded to:

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Regional Administrator

Dec. 22, 1983
Date

NORTH CAROLINA BARRIER ISLANDS
WASTEWATER MANAGEMENT
ENVIRONMENTAL IMPACT STATEMENT

Draft ( )
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Atlanta, Georgia 30365

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EXECUTIVE SUMMARY

PART A. INTRODUCTION

This EIS provides assistance to local governments in the completion of planning for wastewater management facilities on the North Carolina barrier islands. It gives facilities planners a step-by-step process for wastewater management planning. This process is intended to assist in resolving the unique problems encountered on North Carolina's barrier islands and to result in a cost-effective and environmentally sound management system. This process is called the EIS Strategy in this Final EIS.

The EIS Strategy and two other strategies are examined in this EIS. The other two strategies are the 201 Strategy, which is the implementation of existing 201 Plans without revision, and the No Federal Action Strategy, which provides no further federal funding of any wastewater facilities on the North Carolina barrier islands.

After careful evaluation, the EIS Strategy is recommended as the best approach to cost-effective and environmentally sound wastewater management planning for North Carolina's barrier islands. Communities involved in facilities planning are encouraged to use the tools developed in this EIS wherever appropriate.

PART B. BACKGROUND

Draft 201 Facilities Plans, which included many of North Carolina's barrier islands, have proposed the construction of wastewater collection, transportation and treatment facilities to serve large portions of these islands. After an environmental review of the proposed facilities, EPA had significant concerns about the potential impacts of these facilities.

The preparation of a facilities plan is the first step in EPA's three step Construction Grants program for wastewater facilities. To be eligible for federal funding, proposed facilities must be part of an approved facilities plan. Steps 2 and 3 of the Construction Grants program are design and construction, respectively.

EPA funding of the proposed facilities was determined to be a major Federal Action significantly affecting the quality of the human environment; thus a decision to prepare an EIS was made. EPA decided that the preparation of an areawide EIS in North Carolina would result in a consistent approach in EPA's decisions on funding of wastewater facilities for the North Carolina barrier islands. Furthermore, EPA determined that an areawide EIS would be the most expeditious way of addressing the issues involved and promoting cost-effective, environmentally sound decisions.

The issues that have been addressed by this EIS are:

1. Water Quality - A determination of existing water quality, especially the documentation of water quality problems, is important. The draft 201 Plans attempted to justify the need for facilities on the barrier islands based on the pollution of shellfishing waters by failing septic tanks. Existing data did not support this position. Nonpoint mainland surface runoff sources (not septic tanks) appeared to be the problem. The only exceptions were some documented problems in finger-fill canals on several different islands.

2. Alternative Wastewater Techniques - All available technologies for wastewater management on the barrier islands were not evaluated by the draft 201 Plans. On-site and small community systems may provide appreciably more cost-effective alternatives that could support low, medium and potentially high density development.

3. Financial Impact on Local Governments - The financial impact on small municipal governments of operating and maintaining centralized sewer systems is a major issue. Implementation of the draft 201 Plans by these small governments with narrow tax bases and dependence on the tourist industry may place a financial burden on the community and its wastewater customers or taxpayers. The draft 201 Plans have not demonstrated financial and institutional capability for these communities.

4. Nonpoint Source Pollution - Studies in coastal areas in the Southeast have shown that nonpoint runoff is responsible for closure of shellfishing waters where sewer systems exist. New waste disposal facilities may promote higher density development, thus increasing the potential for nonpoint source pollution of estuarine waters. This potential adverse impact has been addressed in the EIS.

5. Groundwater - The EIS addressed the potential impacts on groundwater hydrology from the application of effluent to the soil. The potential for contamination of shallow groundwater by soil absorption wastewater systems was examined. The quality and quantity of this resource, as well as its current and potential use as a drinking water supply, were considered.

6. Sensitive Natural Areas - The EIS has addressed the primary and secondary impacts of wastewater management facilities on sensitive natural areas such as dunes, wetlands and estuarine waters. The effectiveness of the N. C. Coastal Area Management Program is an important factor in addressing the impacts on these systems.

PART C. RECOMMENDED STRATEGY FOR WASTEWATER MANAGEMENT

A strategy for wastewater management on the North Carolina barrier islands was developed through the EIS process. This strategy is intended to provide assistance to local governments in planning for wastewater management for North Carolina barrier islands.

The process of applying the strategy to existing draft 201 Plans or in future planning efforts will consist of investigating the various alternatives available for each 201 area by using procedures developed in the EIS as appropriate. The primary and secondary environmental impacts, as well as the costs, reliability, and implementability of each alternative, will be addressed.

The EIS Strategy is that communities involved in facilities planning are encouraged to update and revise their draft 201 Plans as appropriate using procedures developed by the EIS. The EIS procedure focuses on refinements to population and land use analysis, development of wastewater flows, evaluation of alternative wastewater systems, and financial and institutional considerations which are appropriate for barrier islands.

The procedures are consistent with the Construction Grants program regulations and other facilities plan preparation guidance; however, they are tailored and refined to address the unique environmental and socioeconomic conditions on the North Carolina barrier islands. The procedures were designed to address the six issue areas identified earlier. Special attention was given to two areas which were most lacking in the draft 201 Plans: (1) a thorough evaluation of all wastewater technologies, especially on-site and small community systems, and (2) financial and institutional impacts of operating and maintaining wastewater management systems.

These procedures provide tools to assist the 201 applicant in: (1) determining need and estimating flows, (2) developing viable alternative wastewater management systems, and (3) evaluating alternative wastewater management systems. These tools are designed to identify all viable alternative systems and to promote consideration of the major potential impacts on both the man-made and natural environments. The use of these procedures and tools will not mean that all 201 planning areas will end up with all on-site and small community systems. The procedures will allow them to be fully considered, however.

A case study analysis was performed on a hypothetical barrier island to assist in identifying alternatives and their impacts under the EIS Strategy. The island was designed to incorporate features common to most 201 study areas so as to broaden the case study's applicability. The cost impacts shown below are taken from the case study.

The EIS has identified the following potential impacts resulting from implementation of the EIS Strategy:

1. Costs

   a. The cost of this strategy is low to moderate. (The EIS case study found this alternative to cost approximately $2.6 to 4.2 million.)

   b. Relatively low capital and O&M costs will not be a financial burden on local governments and users.

   c. Additional costs will be incurred to update the draft 201 Plans. These reasonable costs will be 75 percent grant eligible.

2. Implementability

   a. Draft 201 Plans may be revised through use of the EIS. These revisions may be lengthy and costly in some cases.

   b. Existing development will continue to use on-site systems while future development will tend to use a greater proportion of community systems, especially with increased condominium development.

   c. An on-site management agency would not require a highly sophisticated technical support system.

   d. Federal and state funds may be available to resolve existing documented pollution problems.

   e. Septic tanks may surface in storm overwash, making repair necessary for property owners.

3. Reliability

   a. The mechanical reliability of on-site systems and small community systems is high although they are susceptible to some storm damage if erosion or flooding occurs.

   b. The reliability of treatment processes is high if systems are properly installed, operated and maintained.

   c. Reliability of operation on a community-wide basis is high if systems are centrally managed by a public agency.

4. Primary Environmental Impacts

   a. Construction impacts will probably tend to be localized to areas of new development and documented water quality problems.

   b. Functioning on-site and community systems are more likely to be retained.

c. High density development with soil absorption disposal would raise the groundwater table and would locally raise nitrate levels in groundwater.

d. The potential for pollution incidents due to storm damage may be reduced by using on-site and community systems.

5. Secondary Environmental Impacts

a. The strategy allows future development flexibility and desired development density and locations.

b. Future development will likely contain a mixture of high and low densities in response to community land use values and the need for environmental protection.

c. Lower density development will minimize the volume of stormwater runoff per developed acre, thus having less of an impact on water quality and shellfish harvesting areas.

PART D. ALTERNATIVES TO THE RECOMMENDED STRATEGY

The EIS compared the recommended strategy to the alternatives of no action (No Federal Action Strategy) and of approving the draft 201 Plans as submitted (201 Strategy). These two alternative strategies and their impacts are described below.

The No Federal Action Strategy

The No Federal Action Strategy would be a decision by EPA not to participate in the further planning or funding of wastewater management facilities in the study area. Analysis of this strategy by the EIS projects continued growth on the barrier islands even if publicly-owned and funded facilities are not constructed. Without additional EPA assistance, existing wastewater management practices will continue. Localized state regulations will govern the use of soil absorption systems. Individual property owners will be responsible for providing adequate treatment and will bear the cost of renovating failing systems or installing new facilities.

The EIS identified the following potential impacts should the No Federal Action Strategy be implemented:

1. Costs

a. This is the lowest cost strategy. (The EIS case study found this alternative to cost approximately $1.4 million).

b. Costs associated with implementing this strategy will primarily be the responsibility of property owners and developers with some assistance possible from the state for specific studies or projects.

2. Implementability

a. The institutional mechanisms for implementing this strategy are currently in place and functioning.

b. Functioning on-site systems would be retained.

c. Storm damage to wastewater systems should be minimal since most systems are underground; however, septic tanks may surface in storm overwash, causing expense to individual property owners.

3. Reliability

a. Mechanical reliability of on-site and small community systems is high when new. Reliability will decrease as the systems age due to sporadic maintenance.

b. Reliability of treatment processes is high initially but will probably decline over time due to sporadic maintenance.

c. Reliability of operation on a community-wide basis is low since no centralized management is likely to be provided.

4. Primary Environmental Impacts

a. Improperly installed and operated on-site systems could cause a localized elevation of nitrate and bacterial concentrations in surface waters. This is occurring in a few isolated finger-fill canal areas.

b. Existing water quality problems in such areas may not be identified and corrected.

c. Construction impacts would be confined to new developments and areas with failing systems requiring new or modified systems.

5. Secondary Environmental Impacts

a. Lower density development minimizes the potential for adverse impacts to surface waters from stormwater runoff.

b. High density developments must give more detailed consideration to wastewater facilities prior to construction.

The 201 Strategy

The 201 Strategy would be the approval and implementation of the draft 201 Plans without significant changes. The plans would have to be updated in certain areas such as costs. Those plans proposing ocean outfalls (Dare County and Carteret County) would have to incorporate the results of site-specific surveys. The Carteret County plan for the barrier islands would have to be modified since one of the two communities involved elected not to participate.

One of the six plans, Hatteras Island, proposes no action because it was determined that a system is not economically feasible at this time. The other five plans exhibit several similarities. Each plan calls for the replacement of existing on-site wastewater systems (septic systems) with centralized collection, transmission, treatment, and disposal systems. These plans justified the need for facilities based on reports of shellfishing harvest area closings due to elevated fecal coliform counts. The plans also projected additional shellfish area closings with continued rapid residential and commercial developments using on-site systems.

Another similarity is the proposal to provide sewer lines to all areas of these communities, regardless of the current level of development. Pumping stations and force mains are to be used in all facilities to transport effluent to the treatment plant. Secondary treatment is proposed for each facility, along with ocean disposal in Dare and Carteret Counties, spray disposal in Topsail/Surf City and Southwestern Brunswick County, and surface water discharge to the Cape Fear River in Southeastern Brunswick County.

The impacts of the 201 Strategy as determined by the EIS are:

1. Costs

   a. This is the highest cost alternative. (The EIS case study found this alternative to cost approximately $12.0 million).

   b. High capital and O&M costs will mean a large local financial burden both on municipalities and users.

2. Implementability

   a. The costs and management skills associated with operating a centralized system require a more complex and sophisticated administrative structure than now exists in most of the barrier island local governments.

   b. Centralized wastewater systems are susceptible to storm damage. Such damage could disrupt the entire wastewater system and result in more severe effects.

3. Reliability

   a. Mechanical reliability is lower than under the EIS Strategy. Systems with many above ground structures are highly susceptible to storm damage. This susceptibility can be reduced by siting facilities on the mainland.

   b. The reliability of treatment processes is high except in storm damage situations where the potential for adverse environmental impacts is high if the system fails.

   c. The reliability of operation is high in centralized systems when well-trained operators are employed.

4. Primary Environmental Impacts

   a. Construction impacts are community-wide and include effects on surface and groundwater, noise impacts, traffic disruption and short-term habitat destruction.

b. Groundwaters will not be subject to degradation from on-site systems.

c. The concentration of wastewater in one location can create adverse impacts resulting from: (1) damage of the system by storms, (2) impacts to surface and groundwaters from disposal and (3) unsatisfactory operation of the treatment plant.

5. Secondary Environmental Impacts

a. Increased population densities could result in increased pollution to surface water from stormwater runoff, thus adversely affecting shellfishing beds.

b. Sewering marginal land near sensitive natural areas would promote development, adversely impacting the plant and animal resources within these ecosystems.

c. There would be fewer wastewater management constraints on development activities.

d. High density beachfront development has the potential for reducing habitat for shorebirds, including the brown pelican, and may adversely impact loggerhead turtle nesting activity.

PART E. SUMMARY

The EIS Strategy is the recommended approach for wastewater management on the North Carolina barrier islands. The EIS Strategy is the only strategy which will provide for each of the EIS issues to be addressed in the planning process. This strategy should result in more cost-effective and environmentally sound wastewater management system for North Carolina barrier island communities.

The EIS concluded that the 201 Strategy would likely result in costly systems which would produce adverse secondary impacts to the natural environment and adverse financial impacts to local governments. The No Federal Action Strategy would leave certain water quality problems unresolved and would increase the probability of future problems because it would effectively eliminate the continuation of facilities planning.

The EIS Strategy incorporates the following beneficial features:

- The procedures promote documenting and then resolving existing water quality problems.
- The procedures promote sound planning for existing and future wastewater management needs.
- The procedures promote maximum local decision making and provide for disclosure of financial and institutional impacts.
- The procedures minimize costs to communities by promoting consideration of less expensive alternatives.

PART F. DRAFT EIS COMMENTS

Comments on the Draft Statement were received from the following:

Federal Agencies

Advisory Council on Historic Preservation
Department of Health & Human Services, Public Health Service, Centers for Disease Control
U.S. Army Corps of Engineers, Wilmington District
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of the Interior, Southeast Region

State Government

UNC Sea Grant College Program, Marine Advisory Services
N.C. State University, School of Agriculture and Life Sciences, Department of Soil Science
N.C. Department of Cultural Resources, Division of Archives and History
N.C. Department of Administration, Office of Policy and Planning, State Clearinghouse
N.C. Department of Natural Resource and Community Development, Office of Coastal Management and the Division of Environmental Management
N.C. Department of Human Resources, Division of Health Services, Sanitation Branch, Environmental Health Section

Local Government

Brunswick County
Town of Kill Devil Hills
Town of Ocean Isle Beach
Town of Nags Head

Interest Groups

North Carolina Saltwater Fishing Federation
The Raleigh Salt Water Sportfishing Club
National Wildlife Federation
National Audubon Society, Outer Banks Chapter
Sierra Club, North Carolina Chapter
North Carolina Coastal Federation
Southern Shores Civic Association

Other

Henry Von Oesen and Associates
Alternative Systems, North Carolina
Ms. Flora R. Garrett
Mr. John Melvin
Coastland Corporation
Mr. David Clement
Mr. Steve Sawin

NORTH CAROLINA BARRIER ISLANDS
FINAL ENVIRONMENTAL IMPACT STATEMENT
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I. INTRODUCTION

Six 201 Facilities Plans which include barrier islands have been submitted to EPA for approval. These plans are Southwestern Brunswick County, Southeastern Brunswick County, Topsail/Surf City in Onslow County, Carteret County Complex, Hatteras Island in Dare County and Dare Beaches Complex in Dare County. Figure I.1 shows the location of these planning areas.

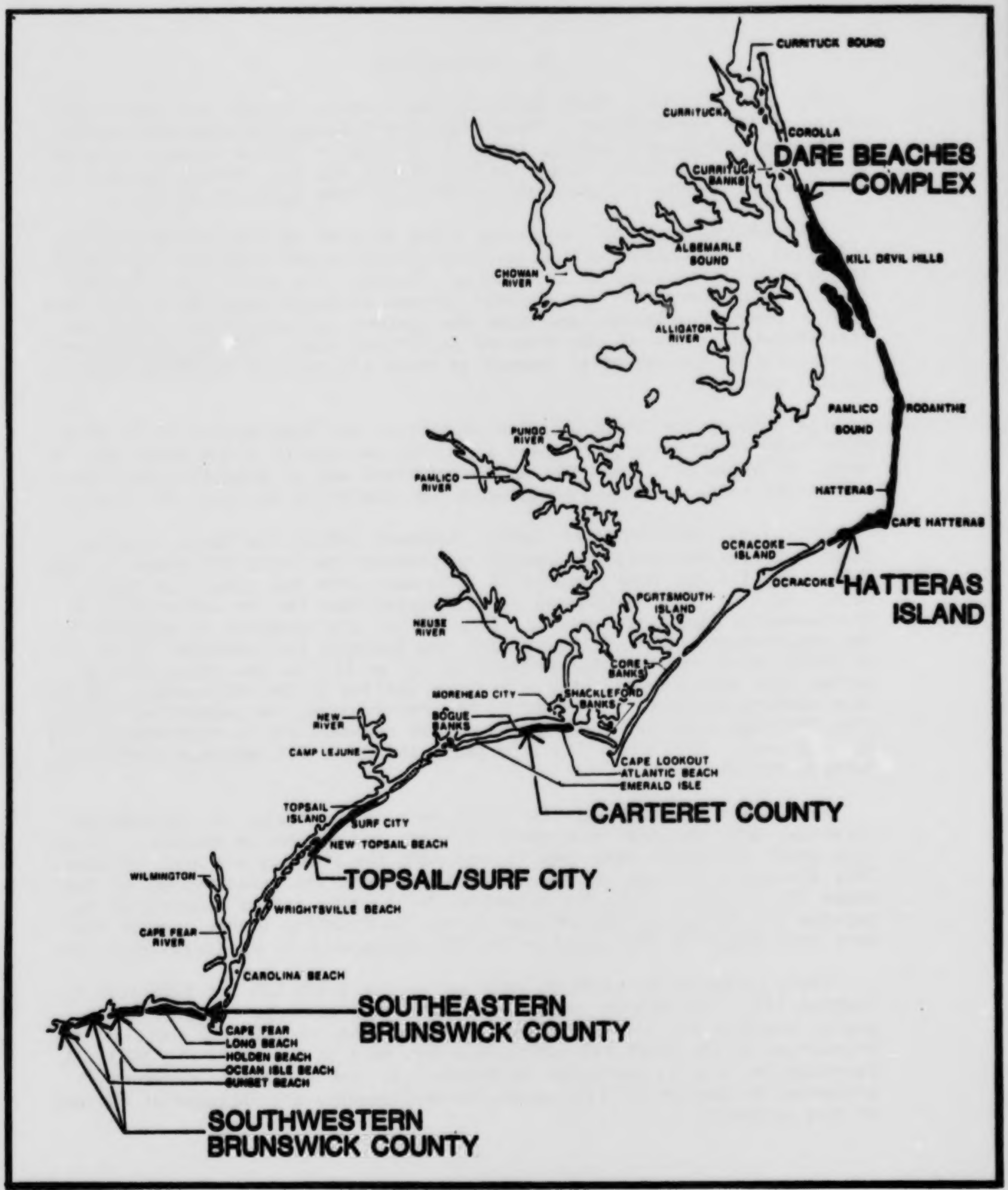
Five of the draft 201 Facilities Plans received by EPA propose the construction of wastewater collection, transportation and treatment facilities to serve large portions of the barrier islands. The sixth plan, Hatteras Island, recommended that two regional systems be reconsidered at a later date when a larger population base made the systems cost-effective. After an environmental review of the proposed facilities plans, EPA had significant concerns about the potential impacts of these six plans on the North Carolina coastal zone.

EPA funding for these proposed facilities has been determined to be a Major Federal Action significantly affecting the quality of the human environment. An areawide EIS was the most expeditious way of addressing the issues identified below and providing guidance for completing the draft 201 Plans.

This Final Environmental Impact Statement (FEIS) for North Carolina Barrier Island Wastewater Management supplements the Draft EIS issued in June 1983. The EIS has been prepared in accordance with the Council on Environmental Quality (CEQ) Guidelines and EPA Guidelines for the preparation of Environmental Impact Statements. This EIS is also prepared in response to the requirements of Public Law 91-190, the National Environmental Policy Act of 1969, which requires the preparation of an EIS for any major federal action that will significantly affect the quality of the environment. While this summary document is intended to be comprehensive, the supporting information furnished with the Draft EIS should be reviewed and is incorporated here by reference. This Final EIS supercedes the Draft EIS wherever conflicts between the two exist.

This Final EIS contains five major sections. Chapter II, Recommended Strategy, describes the recommended strategy and mitigative measures. Steps that grant applicants must take to implement the strategy are also included. This discussion focuses on the policies governing the establishment of the state 201 priority list, the potential for barrier island communities to receive 201 funds, and the changes to the Construction Grants program that went into effect in 1982 based on the 1981 Amendments to the Clean Water Act.

EPA's responses to comments received on the Draft EIS are tabulated in Chapter III. The written comments and the oral comments received at the public hearings are indexed in this section. Chapter III also contains the transcript of the Draft EIS public hearings held on August 23-25, 1983. A coordination list is presented in Chapter IV, and a list of preparers is presented in Chapter V. References and the Appendix are included at the end of this document.


CURRITUCK SOUND
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ALBEMARLE SOUND
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ALLIGATOR RIVER
PAMLICO SOUND
RODANTHE
PUNGO RIVER
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HATTERAS
CAPE HATTERAS
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CAMP LEJUNE
CAPE LOOKOUT
ATLANTIC BEACH
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TOPSAIL ISLAND
SURF CITY
NEW TOPSAIL BEACH
TOPSAIL/SURF CITY
WILMINGTON
WRIGHTSVILLE BEACH
CAPE FEAR RIVER
CAROLINA BEACH
SOUTHEASTERN BRUNSWICK COUNTY
CAPE FEAR
LONG BEACH
HOLDEN BEACH
OCEAN ISLE BEACH
SUNSET BEACH
SOUTHWESTERN BRUNSWICK COUNTY

LEGEND

Figure I.1 Barrier Islands Within 201 Facilities Plan Study Areas

BARRIER ISLANDS E.I.S.
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IV

Prepared by:
CLAUDE TERRY & ASSOCIATES, INC. ATLANTA, GA.
GANNETT FLEMING CORDDRY AND CARPENTER, INC.

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CHAPTER II. RECOMMENDED STRATEGY

The EIS Strategy is composed of procedures developed by this EIS which are intended to refine procedures normally undertaken in the preparation of a 201 Plan. These additional procedures are proposed in response to the needs of North Carolina barrier islands which are characterized by extensive environmentally sensitive areas, highly fluctuating populations and limited financial resources.

The procedures are consistent with 201 Construction Grants regulations and other facilities plan preparation guidance; however, they are tailored and refined to address the unique environmental and socioeconomic conditions on the North Carolina barrier islands. The procedures were designed to address the six issue areas identified in Chapter I of the Draft EIS (DEIS):

1. Surface water quality impacts/closing of shellfish beds
2. Groundwater quality impacts
3. Alternative wastewater management technologies
4. Economic and fiscal impacts on local citizens and governments
5. Sensitive natural areas and potential for storm damage
6. Nonpoint source pollution.

Special attention was given to areas which were most lacking in the draft 201 Plans: a thorough evaluation of all wastewater technologies, especially on-site and small community systems, and the financial and institutional impacts of operating and maintaining wastewater management systems.

A. Description of the Recommended Strategy

The supplemental procedures fall into three major groupings, and each is discussed in turn:

- Procedures for determining need and estimating flows
- Procedures for developing alternative wastewater management systems
- Procedures for evaluating alternative wastewater management systems.

An effort has been made to communicate these procedures in narrative and graphic form. Figure II.1 presents an overview of the EIS Strategy. Each rectangle in the flow chart represents a separate procedure. The following sections of this chapter describe these procedures and refer to detailed flow charts for each procedure, which are found in the DEIS and Alternatives Development Technical Reference Document.

1. Procedures for Determining Need and Estimating Flows

The first subroutine in Figure II.1 graphically depicts the procedures appropriate to determine the need for wastewater management systems and to quantify flows. Determining the need and estimating flows which require additional wastewater management consists of identifying those portions of existing and projected populations that cannot be adequately served by current wastewater management strategies. Essentially, population that cannot be adequately served by current wastewater management strategies is that population whose wastewater management strategies either cause water quality problems or will cause water quality problems when the population served increases.

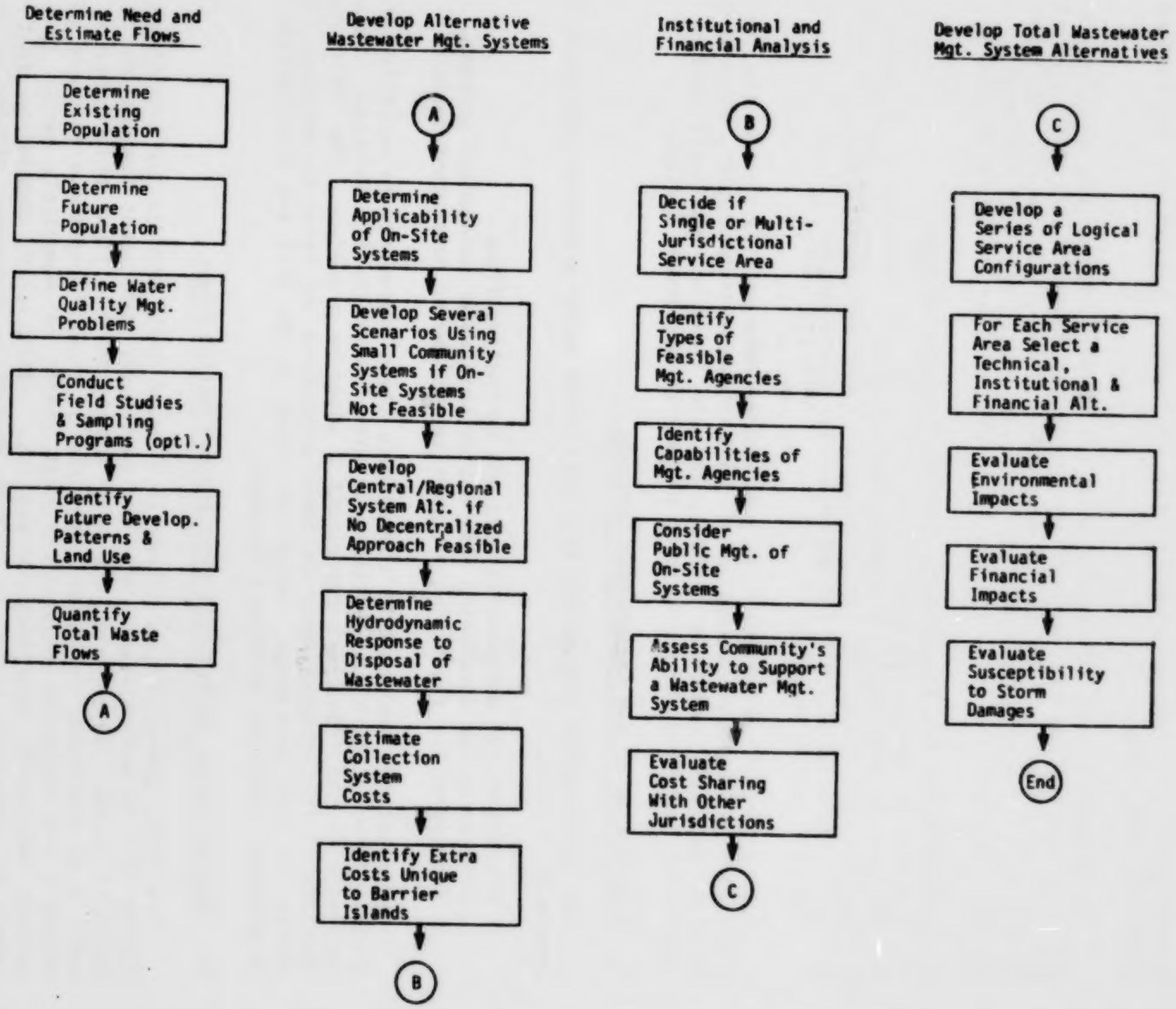

Determine Need and Estimate Flows
Determine Existing Population
Determine Future Population
Define Water Quality Mgt. Problems
Conduct Field Studies & Sampling Programs (optl.)
Identify Future Develop. Patterns & Land Use
Quantify Total Waste Flows
A
Develop Alternative Wastewater Mgt. Systems
A
Determine Applicability of On-Site Systems
Develop Several Scenarios Using Small Community Systems if On-Site Systems Not Feasible
Develop Central/Regional System Alt. if No Decentralized Approach Feasible
Determine Hydrodynamic Response to Disposal of Wastewater
Estimate Collection System Costs
Identify Extra Costs Unique to Barrier Islands
B
Institutional and Financial Analysis
B
Decide if Single or Multi-Jurisdictional Service Area
Identify Types of Feasible Mgt. Agencies
Identify Capabilities of Mgt. Agencies
Consider Public Mgt. of On-Site Systems
Assess Community's Ability to Support a Wastewater Mgt. System
Evaluate Cost Sharing With Other Jurisdictions
C
Develop Total Wastewater Mgt. System Alternatives
C
Develop a Series of Logical Service Area Configurations
For Each Service Area Select a Technical, Institutional & Financial Alt.
Evaluate Environmental Impacts
Evaluate Financial Impacts
Evaluate Susceptibility to Storm Damages
End

Figure II.1 Overview of EIS Strategy

The first step is to quantify existing population served by existing wastewater management strategies. This task tends to be difficult on the barrier islands because the resident population component is a small fraction of the summer peak which includes seasonal residents, overnight visitors and day visitors. Thereafter, projections must be made of these population components for five-year intervals during the planning period. Figure II.2 in the DEIS explains this methodology and shows how the four population components are calculated.

Having determined the existing population, the future population to be served must then be determined. This is accomplished by disaggregating the 1980 Census data for the study area and then calculating ratios of seasonal, overnight and day visitors to permanent residents. These ratios are then used with projections of the permanent residents to determine future population by component. Figure II.3 in the DEIS diagrams these steps.

Next, areas of existing development which are experiencing problems and are in need of new or improved wastewater management systems are identified. This is accomplished by defining water quality problems and by conducting an inventory of actual conditions in the study area. Figure II.4 in the DEIS illustrates these tasks and shows how decisions are reached as to whether wastewater management systems are needed.

Future development patterns are determined by conducting an inventory of areas that can be used for future development in the study area. These areas will be lands on which the Coastal Area Management Act (CAMA) has not restricted development, but the exact nature of the development of these lands will be affected by zoning and other restrictions. Approved population projections should be given careful consideration in defining future development patterns. Figure II.5 in the DEIS shows these steps.

Knowing or having calculated existing and future populations, existing development in need of wastewater management and future development patterns, total flows requiring wastewater management can be determined. This is accomplished by determining existing flows from either existing water use and existing wastewater treatment records or by multiplying population components by prescribed daily wastewater flow estimates. Similar ratios are then used for projecting flows for future developments. The total flow is the sum of the current and future flows.

The development of flow projections on the North Carolina barrier islands is complicated by the fact that two types of peak flows must be considered. First, island communities experience extreme seasonal peak flows between winter and summer users. Then, within the summer peak season, additional peak flows result from tourism peaks such as Fourth of July weekend and other events. Consideration should be given to peak and average flows per month as well as expected daily, weekly or yearly fluctuations. In conclusion, the four population components (permanent residents, seasonal residents, overnight visitors and day visitors) are known to generate widely fluctuating flows by time period. These fluctuations have significant implications when user fees are being set. Figure II.6 in the DEIS illustrates a methodology for quantifying total flows. A final step is identifying and applying flow and waste reduction measures, as shown in Figure II.7 of the DEIS.

2. Procedures for Developing Alternative Wastewater Management Systems

The EIS procedures systematically identify and screen all feasible wastewater management system alternatives. The resulting strategy coordinates information on existing systems' performance, existing and/or potential pollution problems, physical conditions and constraints of the area, and local governments' institutional and financial capabilities. The procedures that make up the integrated development strategy were designed to delete unfeasible alternatives from detailed investigation without excluding viable alternatives from further evaluation.

Subroutine A of Figure II.1 includes an overview of the procedures used to develop alternative wastewater management systems. Initial steps focus on the identification of potentially feasible subsystems. These subsystems address the various technical components of a wastewater management system and include facilities for the following:

- Collection of wastewater
- Treatment of wastewater
- Disposal of treated wastewater effluent
- Handling/disposal of sludge and/or septage generated by the systems.

To facilitate the process, information on existing systems along with documentation of identified pollution problems is incorporated to determine the extent of pollution due to the inadequacy of existing systems. The identification of reasonable alternatives to existing systems is then performed based on actual conditions in the area.

After this process, combining of subsystems into overall systems can be initiated. This step involves the development of the technical components previously identified into viable system alternatives based on the characteristics of the various technical components. To ensure that a complete list of feasible alternatives is identified for projected development densities and patterns, consideration is given to the various degrees of system centralization. The overall system alternatives are therefore categorized into four types of systems: individual on-site systems, community systems, central/regional systems and mixes of these previous three options.

The use of four categories of treatment/disposal systems is intended to facilitate the screening process which is the next step in the development of alternatives. This step results in the development of the principal technical alternatives. Screening of the feasible alternatives identified is to be based on system characteristics and requirements, specified site conditions and design factors, after which the system alternatives not eliminated will be analyzed according to their implementation requirements. From this point, the total system alternatives are to be subjected to cost-effectiveness analysis and evaluation.

(a) Description of Technologies Appropriate for Wastewater Management on Barrier Islands

In the identification of reasonable alternatives for wastewater management systems, the general physical conditions of barrier islands were considered in order to include only those system alternatives that would be compatible with the study area. These general conditions include the following:

- Geology dominated by unconsolidated sediments
- Topography generally consisting of beaches, dunes, and flats
- Soils principally granular in structure, ranging from deep and excessively well-drained to shallow, poorly drained and subject to flooding
- Moderate climate with fairly uniform temperature, precipitation, wind speed and relative humidity with intermittent occurrences of tropical storms, hurricanes and northeasters
- Groundwater regime consisting of a lighter freshwater lens floating atop the heavier salt water; water table depths highly variable but generally tending to be very shallow due to seasonal high groundwater levels
- Primary surface waters are salt and brackish waters that are a mixture of saltwater from the ocean and fresh water from inland runoffs forming a complex hydrological system.

In order to allow for anticipated development densities and patterns, the potentially feasible alternatives were categorized into three types of systems. Table II.1 is a summary of the alternatives' technical components that were identified and include all the technical components that make up a wastewater management system. The following subsections provide a general description of each system type.

(1) Individual Systems

These systems are used by the individual homeowner or small commercial establishment. Historically, they have worked well in barrier island communities. Where such systems are properly installed, operated and maintained, they should continue to offer satisfactory service. As Table II.1 indicates, many treatment and disposal options are available to respond to local conditions.

Some draft 201 Plans have cited existing on-site systems on barrier islands as sources of pollution of nearby surface and groundwaters and of health hazards after rainfalls. A few field monitoring and sampling programs have found this to be true in two isolated specific sites where they were installed in fill material on finger-fill canals. Otherwise, on-site systems are functioning well.

Conversion of existing conventional, on-site disposal fields (soil absorption beds and trenches) to alternative on-site systems can resolve many of the problems stemming from excessively permeable sands and shallow soils with a high water table. In order to attain optimum operation of existing systems, a concerted effort must also be made to repair or upgrade septic tanks and possibly modify the soil absorption fields if insufficient renovation is occurring within the soil medium. Also, in areas where well contamination could be a threat to public health, renovation of on-site systems could decrease risks of water quality degradation.

Table II.1 Sumary of Wastewater Treatment/Disposal System Alternatives

System Type	Collection Options	Wastewater Treatment/Disposal Options	Sludge/Septage Treatment Options
Individual		1. Septic Tank/Conventional Soil Absorption Field 2. Septic Tank/Modified Conventional Soil Absorption Field 3. Septic Tank/Low Pressure Piping System 4. Septic Tank/Mound System 5. Septic Tank/Artificially Drained System (High Water table is lowered) 6. Septic Tank/Evapotranspiration (ET) Bed 7. Septic Tank/Evaporation Lagoon (E) 8. Septic Tank Polishing/Surface Discharge 9. Aerobic Treatment Units/Non-Surface Disposal (soil absorption field, mound system, ET bed, E lagoon) 10. Aerobic Treatment Units/Surface Discharge 11. Holding Tank for Temporary Storage of Wastewater and Later Transport (Usually via Tank Truck) to Central Disposal Site. 12. In-House Wastewater Treatment and Recycle (incl. Composting Toilets) 13. Wastewater Segregation and Reuse	1. Land Application of Sludge/Septage 2. Sludge Landfilling-Area Fill 3. Sludge Storage 4. Sludge Landfilling-Trenching 5. Sludge/Septage Lagoon 6. Co-Incineration 7. Composting Sludge/Septage 8. Septage Treatment/Disposal 9. Conventional Landfill
Community	1. Small Diameter Gravity Sewers 2. Vacuum Sewers 3. Pressure Sewer, STEP (Septic Tank Effluent Pump) 4. Pressure Sewer, GP (Grinder Pump) 5. Conventional Gravity Sewers	1. Community Soil Absorption Field 2. Community Septic Tank & Mound System 3. Community Evaporation and Evaporation/Infiltration Lagoons 4. Multiple-Compartment Septic Tank/Soil Absorption Field 5. Lagoon/Spray Irrigation (Slow Rate) System 6. Package Plant/Surface Water Discharge 7. Package Plant/Percolation Ponds 8. Package Plant/Rotary Distributor 9. Marsh-Pond/Surface Water Discharge 10. Oxidation Ditch/Surface Water Discharge	1. Land Application of Sludge/Septage 2. Sludge Landfilling-Area Fill 3. Sludge Storage 4. Sludge Landfilling-Trenching 5. Sludge/Septage Lagoon 6. Co-Incineration 7. Composting Sludge/Septage 8. Septage Treatment/Disposal 9. Conventional Landfill
Central/Regional*	1. Gravity Sewers 2. Force Mains	1. Lagoon/Spray Irrigation (Slow Rate) System 2. Physical/Biological Treatment Plant/Inland Surface Water Discharge 3. Physical/Biological Treatment Plant/Ocean Outfall	1. Land Application Sludge/Septage 2. Sludge Landfilling-Area Fill 3. Sludge Landfilling-Trenching 4. Sludge/Septage Lagoon 5. Co-Incineration 6. Composting 7. Conventional Sanitary Landfill

*Central/Regional Systems can also incorporate the collection alternatives proposed for the Community Systems for their collection/transport systems, when feasible.

Note: For direct discharge alternatives obtain effluent limits from the N.C. Department of Natural Resources and Community Development, Div. of Environmental Management.

Source: Gannett Fleming Corddry and Carpenter, Inc. 1981.

(2) Community Systems

A community system serves a small cluster of usually ten to several hundred residences. It involves centralized collection in conjunction with treatment/disposal alternatives that do not differ significantly from individual systems, although a few more options become feasible. Small community systems can provide a wastewater management solution in an area of failing individual systems and preclude the need for connection to a central/regional system, if one is available. Small community systems may also be used for new development at densities greater than those supported by individual on-site systems or in areas not suited for individual on-site systems due to poor soils or seasonally high water tables. For these small systems, the cost of collection, especially by force mains and conventional gravity sewers, is often significant. Therefore, the alternatives identified for the collection system are a major cost factor of the whole system. With the larger flows from a collection system, flow equilization prior to treatment units, particularly package plants, should be utilized.

(3) Central/Regional Systems

These systems have comprised the traditional approach in 201 Plans to wastewater management and involve extensive collection systems leading to a centralized treatment facility. The main consideration is that a sufficient, relatively contiguous development be available to make this approach financially viable. To minimize collection costs for a large-scale system, the innovative collection alternatives used for community systems can be incorporated in the collection/transport system whenever possible for these regional systems.

(4) Combination of Systems

In many instances a community can be served most cost-effectively by a mixture of individual on-site, small community and central/regional facilities. Such an alternative should be developed and carried through the evaluation process.

(5) Sludge/Septage Handling and Disposal Systems

This has been considered an important factor in wastewater management system development for barrier islands and is a component of all alternative systems. Many of these disposal techniques are suitable for both septage and sludge disposal and have limited application based mainly on constraints due to state regulations, land area availability, and volume of sludge and/or septage generated by the treatment components in the various system alternatives. All sludge/septage disposal alternatives are generally centrally managed and operated, regardless of the type of wastewater treatment/disposal system utilized.

The DEIS contains a series of technical appendixes. A detailed description of each alternative is provided in Appendix A, Details of Wastewater Management Options. Included in Appendix B, Wastewater Management System Selection Criteria, are lists of advantages, disadvantages, modifications and constraints for each alternative. Additionally, engineering design data for each of these systems is presented in Appendix C, Wastewater Treatment Alternatives Engineering Design Criteria.

(b) Procedures for Selecting Technically Feasible Components of Wastewater Management Systems

One of the more complex problems in assessing the wastewater management system requirements of an area or group of areas is that of determining what portion of that area's needs can be managed with on-site systems using soil absorption systems and what portion of the area's needs, if any, must be managed by use of some form of transport, treatment and disposal system. This analysis is detailed in Figure II.9 in the DEIS.

Population should be distributed to the study area based on the use of on-site systems as consistent as possible with projected future land uses. The next step is to compare population figures and land uses resulting from this alternative with approved population projections and land uses. Areas of conflict should be identified and delineated on a map:

No Conflict:
Areas where population and development densities can be supported by on-site systems.

Conflict:
Areas where existing wastewater systems have documented problems.
Areas where development densities cannot be supported by on-site systems.
Areas not suitable for on-site systems due to soil limitations.

For areas where conflicts exist, consideration should be given to the following measures:

- Revise land uses and population figures
- Select community systems for higher density areas
- Select community systems for areas with unsuitable soils
- Select a central/regional system.

The first alternative for areas not suitable for on-site systems is to consider whether the projected population numbers are realistic and desirable. If not, population distributions can be revised, and the new projections can be checked to see if they now may be accommodated by on-site systems. If the new projections allow the population to be served, an assessment is made if the projection and resulting distribution are reasonable considering existing platting, zoning and known development interests. (Include environmental, socioeconomic and financial impacts in this determination of reasonableness.) If this adjustment is satisfactory, the need to publicly provide for off-site treatment may have been removed, and no further alternatives development may be necessary.

If the population and land use adjustments and on-site systems are not fully acceptable, several small community system alternatives should be developed. A minimum of two alternatives should be developed. One alternative, utilizing on-site systems to the maximum and small community systems to solve existing water quality problems, should be developed. A second alternative should also be developed utilizing on-site systems and small community systems for solving both existing water quality problems and accommodating future high density development or development projected on unsuitable soils. These alternatives should be carried into more detailed development and evaluation tasks along with the previously developed on-site alternative.

If the small community systems alternatives are not fully acceptable, consideration should be given to adjusting projected populations and/or modifying the grouping of the small systems. If these developed alternatives do not meet all needs, consideration should then be given to central/regional systems.

The major factors in developing central/regional systems are alternative phasing of facilities and alternative groupings of major service areas. Intergovernmental agreements to accomplish economies of scale should be considered.

Consideration should be given to the impacts of the various discharge modes. Discharge to surface water bodies is frequently precluded on barrier islands, both because of the lack of suitable receiving streams and because of the potential negative environmental impacts of such discharges. State law allows no discharges to SA waters. Discharges may be permitted to SC waters where adequate assimilative capacity exists. Surface discharges to estuaries are similarly regarded by state regulations, due to potential impacts on shellfish and other resources. Ocean outfalls are typically not cost-effective for disposing small volumes of effluent and may have undesirable impacts on beach-side communities.

The typical discharge modes on barrier islands involve surface or subsurface disposal of effluent on the soil. Several factors regarding wastewater disposal into groundwater deserve consideration. These factors include:

- Potential for human recreational body contact with bacteria and viruses from wastewater
- Bacterial and nitrate contamination of drinking water supplies
- Overenrichment of the near surface waters with nutrients.

Typically, such negative impacts can be avoided by incorporating proper elements in system design. Design criteria which can eliminate or significantly minimize the above mentioned effects include:

- Spatial separation of disposal areas from surface waters
- Disinfection systems to alleviate potential for bacterial contamination
- Spatial separation of wastewater discharges from potable water supply wells
- Consideration of depth to water table and use of mounds or other appropriate on-site technologies
- Consideration of the potential uses for the groundwater in the area of discharge. If no future use for potable water supply is planned, different loading considerations may be applicable.

At this point several on-site, small community and/or regional treatment systems and land areas suitable for ultimate disposal are to be developed for further, more detailed evaluation. Several reasonable combinations of system elements may be structured which meet the volume and load requirements within the constraints of hydrology, soils, depth to water table, topography and public health considerations. These systems should be examined for consistency with statutory and socioeconomic requirements (i.e., are the system components legal in North Carolina, what impact does the system have on neighboring land uses, etc.). The feasible systems identified then receive further consideration in subsequent tasks. Technically and identified institutionally acceptable alternatives should be evaluated for cost-effectiveness at the volumes and loads to be handled.

Determination of the small community systems appropriate for a given community is best done with input from local sanitarians, hydrologists or similarly trained persons with local on-site experience. Each barrier island area is to some extent unique in wastewater treatment needs, soil quality and quantity available for use in treatment and disposal, financial capability to fund part or all of the needed facility, and social and political structure. While the needs may differ, many examples now exist nationally of small communities adapting various technologies to conform to their specific needs.

At the conclusion of the technical development of alternatives, several of the options should be evaluated further (in subsequent tasks). An alternative employing on-site systems with small community systems used to solve existing water quality problems should always be developed and carried through subsequent tasks. If this system is fully acceptable, no further alternative development may be necessary. If not acceptable, an alternative comprised of on-site systems and small community systems to handle existing water quality problems and future high density areas is developed and always carried through the remaining development and evaluation tasks. If these alternatives are not fully acceptable, various central/regional alternatives should also be developed and carried through the detailed development and evaluation tasks.

(c) Procedures for Determining the Hydrodynamic Response to On-Site Disposal of Wastewater

When determining the applicability of on-island disposal systems to a given area, it is important to consider the response of the water table aquifer to disposal of wastewater. Wastewater disposal on barrier islands should be considered a net addition to total groundwater recharge if water is initially obtained from mainland sources. This net addition could result in physical contact between the water table and the bottom of drain field trenches or even surfacing of effluent.

The analytical solution presented in the DEIS (pp. II-18 ff.) describes the hydrodynamic response of the water table to land disposal of wastewater in an idealized representation of actual aquifer configurations. In actuality, aquifers are not homogeneous nor is the permeability of the unit the same in all directions. Existing aquifers on barrier islands are created by complex geologic processes that in certain cases may have led to irregular stratigraphy of confined and unconfined aquifers. The prediction that can be carried out with the expression presented in the DEIS is a best estimate; this estimate approaches more closely the actual hydrogeological environment as the actual conditions approach the idealized configuration.

EPA Region IV is currently conducting a groundwater study on North Carolina barrier islands. The purpose of this study is to demonstrate the use of this model through the collection of groundwater data, both hydrological and water quality related. The study plan, included in the Appendix, provides details of the study.

(d) Procedures for Estimating Collection System Costs

Cost estimates for collection systems should be done in stages. Alternative or innovative collection systems should be considered when they can be shown to be cost-effective. The size and cost of each component must be developed. Unit cost information should be developed from manufacturer's data where possible. Construction costs can be developed from EPA information or local contractors.

(e) Procedures to Identify Special Costs Incurred on Barrier Islands

Since the soil characteristics in many areas are not suitable for the foundations of treatment facility structures, the additional cost of pilings or other special foundations has to be considered. Additionally, structures have to be built to withstand the effects of weathering including high winds, sea spray corrosion and sand abrasion. These parameters affect both the initial construction costs and the long term operation and maintenance costs of the system.

The investigator should determine if increased initial costs for heavy duty coatings, more ruggedly constructed treatment equipment or the use of stainless steel in place of other less corrosive and erosive metals can be justified over the life of the facility due to decreased operation and maintenance costs of more weather resistant facilities.

Sand and salt spray have a detrimental effect on the serviceability of structures and equipment. Facilities constructed on the barrier islands must be recoated or painted more often, bearings have to be repacked more often and wear of all moving parts is increased due to the sand and corrosion problems. Quantifying the additional costs associated with these problems necessitates studying manufacturers' coatings data to determine the expected lives of their coatings, determining the effects that the weather and sand will have on the designed bearing life of critical equipment and evaluating the effects that the corrosive atmosphere will have on electrical equipment.

(f) Procedures for Developing Institutional Management Alternatives

The implementability of a technical wastewater management alternative requires consideration of the legal and institutional requirements of each alternative system previously developed. State enabling legislation provides a far wider range of powers and authority to cities than are granted to unincorporated communities. The ability of a management agency to own real property, enter into contracts, set rates, receive grants, employ personnel, etc. are critical aspects of implementability.

Institutional considerations were not fully analyzed in most of the draft 201 Plans. Therefore, the EIS developed a series of worksheets and other analytic tools to aid grant applicants in defining their institutional and financial constraints and developing optimum management alternatives. These tools were presented in a series of workshops during December 1981 and January 1982.

Institutional considerations focus on what management agencies may receive 201 funds and administer wastewater management facilities. Where wastewater management is already a community service, an analysis of the effectiveness of the present management structure is the point of departure in determining whether existing institutional arrangements can be expected to adequately manage a new or upgraded system or whether a new mechanism needs to be devised.

Where wastewater management represents a new service, options must be explored as to whether the community should:

- Serve only itself
- Incorporate adjacent neighborhoods into its service area through its powers of extra-territorial jurisdiction
- Be served by a larger jurisdiction such as the county
- Make overtures to join another jurisdiction in a cooperative venture.

North Carolina law provides possibilities for a large number of institutional management options:

- A city utility or public works department
- A county utility or public works department
- A joint management agency
- A county service district
- A sanitary district
- A water and sewer authority
- A metropolitan water district
- A metropolitan sewerage district
- A private water and sewerage company.

Two or more communities may sign an interlocal agreement whereby one of the parties provides services to all the communities. In a given 201 planning area, it is possible for more than one of the above agencies to be providing services.

Figure II.13 in the DEIS presents a simplified methodology for selecting one or more feasible institutional management alternatives. The user should step through the methodology once for each technical alternative developed. This discussion is supplemented by an EIS task report, Implementing Wastewater Facilities Plans in the Barrier Island Region of North Carolina: Institutional and Financial Issues and Needs (Briscoe, Maphis, Murray & Lamont, Inc. 1981).

(g) Procedures for Developing Financial Management Alternatives

The steps a community should follow in reaching a decision about the affordability of each of the technical solutions previously documented have been developed into a series of procedures shown in Figure II-1 as subroutine C. The issue of affordability focuses on the ability of the community both to raise capital and to meet operating costs.

The development of financial management alternatives is a particularly important task since barrier island communities are characterized by highly fluctuating seasonal flows. The issue of user fees requires detailed examination. Several options are available to accommodate the incremental costs of providing capacity for seasonal users:

- Peak month(s) surcharge for all seasonal users
- Seasonal differential based on type consumer
- Seasonal differential based on type technology used.

The analysis begins by assessing the present financial status of the community. Whether or not a community decides to serve itself, it should explore the alternative of cost-sharing schemes.

Before a community can consider assuming additional long term debt or operating costs of a wastewater management system, it must first assess its present financial condition. An understanding of the existing resource base, current practices and commitments, and fiscal capacity of the local government is essential.

(1) Bonding Capacity and Sources of Operating Income

The first step is to delineate the bonding capacity of the local government. Bonds may only be used to defray capital expenditures, not operating costs. By state law, local governments' total bonding capacity is set at eight percent of the total assessed property tax valuation. Both general obligation bonds and lease-purchase agreements are subject to the eight percent ceiling although revenue bonds are not. The only exception to this provision is that when the North Carolina Environmental Management Commission or a court requires the implementation of wastewater treatment systems, general obligation bond debt is not subject to the eight percent net debt limit.

The next step is to compile data about existing sources of revenue which may legally be used to operate wastewater management systems. A trend analysis of revenue sources should be prepared by individual source to identify which sources can be expected to increase or decrease, particularly in response to inflation.

Proposed tap-on fees and user charges should be reviewed to evaluate their economic and political acceptability. EPA regulations (July 1982) require that the following total annual costs to users should not exceed certain percentages of median family income in the study area and at the minimum must recover the costs of operation and maintenance and replacement:

1.00 percent when median family income is under $10,000
1.50 percent when median family income is $10,000-$17,000
1.75 percent when median family income exceeds $17,000.

If these guidelines are exceeded, special evaluations and procedures are necessary.

The affordability criteria should be applied only to the permanent residential population components and should not include the seasonal components. If necessary, more realistic fees and charges should be developed. Thereafter, the income from proposed user fees should be computed and added to other sources of revenue.

(2) Long Term Debt and Operating Costs

Projected operating costs should also be reviewed and compared against anticipated system revenues. If a deficit results, other sources of revenues which could serve to make up any differences between proposed user charges for the new system and actual costs should be evaluated.

Figures should also be compiled identifying the community's outstanding long term debt. Thereafter, an analysis of unused debt capacity should be made. If the community's bonding capacity is not large enough to accommodate a wastewater management general obligation bond issue, then the community's options include:

- Reducing the size of the bond issue by increasing tap-on fees
- Reassessing the property tax base to determine if the debt ceiling can be raised
- Considering the use of revenue bonds
- Exceeding the ceiling if implementation of the project is required by the North Carolina Environmental Management Commission or courts
- Considering other user charge systems.

(3) Identification of Additional Sources of Funds

If a shortfall is identified in either operating funds or the ability to finance capital costs, then new sources of funds need to be found. A shortfall in operating income generally results when the proposed user charges must be reduced and when subsidies from other revenue sources are not enough to make up the difference.

(4) Assessment of Existing Fiscal Capability

Public hearings should be held to present the findings of the financial analysis to system users and gather their comments. At a minimum, all property owners, both permanent and seasonal residents, should be notified by mail of the public meeting and anticipated financial impacts.

Thereafter, local officials can decide whether or not the community can afford the capital and operating costs of providing wastewater management systems. If the decision is negative, then community leaders should immediately investigate the costs of entering into a service agreement with an existing agency or new agency. Even if the community can afford to serve itself, the analysis of other financial management alternatives should proceed to the investigation of all reasonable alternatives.

Additional financial issues which need to be examined include:

- Plans if outside funding sources are not available

- Sensitivity analysis which measures the degree of uncertainty attached to assumptions about the financial implications of population projections, flow volumes over time, inflation, energy costs, costs of goods and services, etc.

- Refinements to the local taxation system so that system beneficiaries more directly bear the costs. Examples include the issues 1) should tourists be paying a larger share than they do presently and 2) the assurance that new growth pays its fair share.

Although this discussion might seem to focus on the development of financial management alternatives for central or regional treatment plants, the development of financial management alternatives for small community systems should not be overlooked. Since both the costs and the benefits are likely localized, either direct assessments or assessment bonds provide the most reasonable financing mechanism in situations where wastewater management systems in areas of existing development need upgrading or replacing. In areas of future development where small community systems or individual on-site systems are appropriate, construction costs are routinely borne by the developer or individual homeowner.

Additional discussions about financial considerations can be found in a task report, Implementing Wastewater Facilities Plans in the Barrier Islands Region of North Carolina: Institutional and Financial Issues and Needs (Briscoe, Maphis, Murray & Lamont, Inc. 1981).

(h) Procedures for Developing Total Wastewater Management Systems Alternatives

Figure II.1 depicts in subroutine D the evolutionary process that developing reasonable wastewater management systems appropriate for a given area requires. This task is begun by assessing all appropriate technologies applicable to any given service area and then to all groups of areas that reasonably can be considered together. Initially the development of logical service areas is a process of grouping subareas that a common technology such as on-site soil absorption systems will handle. The objective of this process is to develop the reasonable technically feasible wastewater management systems that can handle the requirements of each service area.

Having generated a list of feasible technologies appropriate for the area, operational and financial management schemes then should be developed for each of the feasible technologies. The operational management scheme for each technology will have to consider the political jurisdictions involved, the ownership of the properties and treatment facilities, legal or statutory restraints and how the particular technology will be financed.

3. Procedures for Evaluating Alternative Wastewater Management Systems

Several alternatives will have been developed, each with a technical, institutional and financial component. The next step, therefore, is to evaluate each alternative with regard to those criteria upon which system selection depends:

- Cost and local financial impacts
- Primary and secondary environmental impacts
- Implementability.

The evaluation of each criteria within each alternative is conducted in two phases. The first phase involves the documentation of impacts. The second phase addresses the significance of the impact. Numerous techniques exist for evaluating significance. Some are very complex and subject to considerable manipulation. Other methods are very simple and consist of displaying impacts in tabular form.

(a) Cost and Local Financial Impacts

Barrier island communities tend to have relatively modest tax bases, and permanent residents are sensitive to the costs of wastewater management systems. Procedures for evaluating costs are documented extensively in various EPA publications.

A detailed evaluation of all cost components in each of the alternative wastewater management systems is required in order to perform the comparative cost analyses. Land, construction, project (engineering, financing, and contingencies), salvage value, and operation and maintenance costs are developed for each management system for incorporation into a net present worth cost analysis. The present worth cost analysis establishes a basis for comparison of total costs (capital and annual operations costs) for each of the wastewater management alternatives. These total costs include the federal share of the costs associated with construction grants. Comparative cost analysis (either present worth or equivalent annual cost) is an EPA requirement and serves as the primary cost evaluation criterion according to EPA guidelines.

The value of using present worth analysis is that the total costs of each alternative are related to each other during the 20-year planning period. Present worth analysis brings each total cost back to an equivalent investment cost at the beginning of the planning period, given a fixed interest rate on the investment. Thus, alternatives with high construction costs and low O&M costs can be equitably compared against alternatives with low construction costs and high O&M costs.

A present worth analysis requires that both public and private costs directly related to a project be included. Cost for laterals and ineligible rehabilitation of private on-site facilities are examples of private costs that should be estimated and included in present worth calculations. Although present worth analysis does not recognize the difference between public and private costs, it is necessary for local cost estimation.

The EIS has developed additional procedures, however, which respond to the financial profile of barrier island communities. The EIS found that significantly different financial impacts can be experienced at the local level, given several wastewater management alternatives. Much depends upon the degree to which costs are internalized or externalized. The selection of systems eligible for state or federal grants externalize many costs. Requiring tourists to pay their share of systems costs externalizes a large portion of what would otherwise be a local burden. Dependence on the ability to externalize costs can be dangerous for a community; provision must be made for the eventuality that state or federal funds may not be forthcoming.

(1) Risk Analysis

Evaluation of financial impact is a matter of both the size of the financial commitment involved relative to the community resource base as well as the financial risk involved in the undertaking. Risk assessment is often overlooked, particularly a systematic identification of downside risk. Risk analysis should seek to pinpoint areas of uncertainty, and various types of sensitivity analysis are important tasks in the overall evaluation of financial impacts to local communities. Therefore, an initial task in screening all wastewater management alternatives should be the identification of what percent of life cycle total costs are capital costs (relatively firm, up front dollars) and what percent are operating costs (annual projections over 20 years). The financial impacts of both the capital costs and operating costs of each alternative must be assessed. Table II.3 in the DEIS is a questionnaire which should be filled out for each alternative.

(2) Financial Impacts of Storm Damage

Repair and replacement of wastewater management systems due to storm damage can represent a major community financial burden. Every effort should be made to minimize this type financial risk. When determining the susceptibility of the various wastewater management system alternatives to damage from storms, three system characteristics of the alternatives should be considered:

- Degree of centralization
- Amount of exposed structure
- Ability of systems to assimilate lower quality effluent in the aftermath of a storm.

Each of these topics is discussed in the DEIS (pp. II-39 ff).

(b) Primary and Secondary Environmental Impacts

Impacts may be primary, produced by the construction, operation and maintenance of the system, or secondary, derived in some fashion from the existence of the system and its capacity. These effects are also termed direct and indirect, respectively. Impacts may be characterized as short term (construction noise) or long term (loss of a species of fish or commitment of a land area for 20 years). The short or long term nature of the impact may be important in decision making, since impacts acceptable to local populace on a short term basis are frequently not acceptable indefinitely. Impacts must also be considered either positive or negative. Effort expended in estimating impacts accurately may be extremely beneficial, since positive benefits not initially foreseen may emerge or potentially severe adverse impacts can be avoided, mitigated or at least foretold.

The magnitude of impacts should be estimated. In some cases, quantification of the impact is possible. However, quantification can be deceptive when applied to systems where the impacts differ only in degree. Arbitrary numerical quantification of magnitude may lead to reliance on small differences in numbers which are individually not really quantifiable. The use of positive and negative descriptions can provide a range of identification without the use of numbers in arbitrary situations.

Primary, or construction-related impacts, tend to be relatively minor in barrier island communities, especially when on-site and small community systems are selected. Secondary impacts, however, can be extremely significant. Areas of major concern include groundwater resources, surface water resources, and impacts to sensitive natural areas. The EIS has developed specific procedures to ensure that the potential impacts on these resources are recognized during the development and evaluation of alternatives.

(c) Implementability

Procedures for assessing implementability must focus on engineering constraints, fiscal and institutional feasibility and socio-political acceptability. The engineering evaluation focuses largely on any constraints which must be acknowledged regarding construction or operation and maintenance of each proposed alternative. Construction constraints could include:

- Shortages of materials
- Shortages of construction crews trained in a particular skill
- Local lack of experience in a new construction technique
- Hazardous conditions.

Operation and maintenance concerns typically revolve around the following factors:

- Reliability of treatment: the ability of the process to consistently produce uniform treatment efficiencies and meet water quality standards
- Flexibility: the ability of the treatment process to adequately handle fluctuating wasteloads, variable flows, and new waste streams
- Operability: an analysis of the ease of operation and maintenance and considerations of the availability of trained operators and support personnel
- Energy usage
- Adherence to applicable state and local codes.

The evaluation of fiscal and institutional feasibility would be accomplished by comparing the worksheets (Table II.3 in the DEIS) filled out for each alternative as well as worksheets in the Technical Reference Document, Financial Planning Handbook.

The evaluation of the socio-political acceptability of each alternative is carried out mainly by means of the public participation program where comment from local officials and other affected parties is gathered.

B. Impacts of the Strategy

This section of the EIS describes the impacts that can be expected if the EIS Strategy is implemented. Impacts on development potential, environmental impacts, financial impacts and implementability are discussed below.

1. Impacts on Development Potential

An investigation was undertaken to ascertain if an adequate amount of land suitable for soil absorption systems was available to accommodate future growth. Concern has been expressed that development potential would be adversely impacted if central/regional facilities were not provided. The EIS analysis shows that more than adequate acreage suitable for soil absorption systems is available to support projected population levels.

(a) Land Capability Analysis: Existing Development

Existing development on the barrier islands has been surveyed to determine the relationship between soil suitability for on-site soil absorption systems and historic development patterns. Aerial photographs from the USDA Soil Conservation Service Soil Survey of the Outer Banks were used to correlate soils and development existing in 1977. The general survey findings for each community are found in the DEIS (pp II-45 ff).

Historical development patterns, as measured by an analysis of soil survey aerial photographs, appear to support the wisdom of previous landowners and builders in selecting the best land available for barrier island development. The vast majority of structures existing in 1977 were built on lands that are fully capable of providing adequate wastewater treatment using the prevailing technology: septic tanks and soil absorption fields. Much of the remaining land can accommodate this type of development, both raw land and areas available for infilling with additional structures. Additional large acreages of high land are suitable for other on-site systems (mounds, low pressure pipe systems).

(b) Land Capability Analysis: Appropriate Systems for the Future

The six 201 study areas have been assessed by mapping two data variables: sensitive natural areas and soil suitability for on-site wastewater management systems. The purpose of this exercise was to determine the land use capability of barrier islands based on the use of various wastewater management systems. Each 201 study area was divided into lands identified as sensitive (CAMA Areas of Environmental Concern and Registered Natural Areas) or non-sensitive (all other lands encompassed by the U. S. Soil Conservation Service in the Soil Survey of the Outer Banks). In addition, each study area was divided into areas suitable for some type of on-site soil absorption wastewater management systems (those lands with 12" or greater depth to the seasonal high water table) and those unsuitable for any form of on-site soil absorption systems (those lands with less than 12" depth to the seasonal high water table). Data for depth to seasonal high groundwater was derived from the Soil Survey of the Outer Banks and was described in Table II.6 of the DEIS.

(1) Land Capability Classification System

Four categories were developed which combine sensitive/non-sensitive areas with suitable/non-suitable soils for determining the development potential of each island. Maps showing these categories are found in the Alternatives Evaluation Task Report. The four categories are described as follows:

Category 1: Suitable/Non-sensitive Lands:

These lands can support on-site soil absorption wastewater management systems, and they are not included in lands protected by the regulations governing Areas of Environmental Concern as identified by the North Carolina Coastal Management Program. These lands offer optimal development potential for barrier island uses.

Category 2: Unsuitable/Non-sensitive Lands:

These lands will not support on-site soil absorption systems, and they are not regulated by the Coastal Management Program. These lands are considered developable, but they will require wastewater management systems with off-site disposal in order to utilize the land.

Category 3: Suitable/Sensitive Lands:

These lands consist of soils capable of supporting on-site soil absorption systems, but due to their environmentally sensitive nature, a use permit is required from the North Carolina Coastal Management Program which assures that development is compatible with the protected resource. Therefore, while the land is considered developable in many instances, specific siting and building criteria must be implemented to allow project construction.

Category 4: Unsuitable/Sensitive Lands:

These lands are incapable of supporting on-site soil absorption systems, and they are protected by regulations governing Areas of Environmental Concern. Lands within this category are considered largely undevelopable as they consist primarily of ocean hazard lands and marshlands.

(2) Land Capability of Each Study Area

Table II.2 shows the number of acres of land in each of the four categories per 201 study area. Lands with greater than 12 inches to seasonal high water table comprise 45.0 percent of the total land area. Of the remaining 55.0 percent of land, approximately 38.2 percent is marshes and wetlands. The Alternative Evaluation Task Report discussed the land capability of each study area in detail.

(3) Development Potential of Each Land Category

The four land categories identified are significant because they indicate the relative development potential of all lands in each study area. Category 1 lands are good sites for development because they present no significant environmental problems (erosion, wetlands, critical habitat) and also allow on-site soil absorption wastewater management systems. Such lands range from a low of 13.2 percent in the Topsail/Surf City area to a high of 38.5 percent in the Southeastern Brunswick County area.

Category 2 lands can be developed without significant environmental effects, but the builder must determine how wastewater management will be provided since on-site systems are not feasible. In this case, community systems using off-site disposal may be appropriate for multi-unit projects. Single unit or small projects may use composting toilets or other similar alternative and innovative wastewater treatment systems. Another potential solution to wastewater problems on non-suitable soils is to transport effluent to an adjacent site which has more than 12 inches of depth to the seasonal high water table. In cases where communities or subdivisions use this technique, the disposal site could be used as a park or open space for all participating land owners. Percentages of land in Category 2 tend to be quite small with the exception of the Dare Beaches and Hatteras Island area where Category 2 lands represent 24.0 and 31.5 percent of total land.

Table II.2 Acres by Sensitive Area/Soil Absorption System Suitability Category

Land Capability Category 201 Plan	Category 1		Category 2		Category 3		Category 4		
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Total Acres
Southwestern Brunswick Co.	1409	20.2	317	4.5	1395	20.0	3855	55.3	6976
Southeastern Brunswick Co.	2988	38.5	372	14.8	1125	14.5	3277	42.2	7762
Topsail/Surf City	1074	13.2	905	11.2	1161	14.3	4967	61.3	8107
Carteret Co./Bogue Banks	1276	30.6	413	9.9	1340	32.2	1138	27.3	4167
Hatteras Island	2437	27.0	2850	31.5	1808	20.0	1946	21.5	9042
Dare Beaches	4861	34.3	3397	24.0	1905	13.4	4007	28.3	14,170
Totals	14,045	28.0	8,254	16.4	8,734	17.4	19,190	38.2	50,224

Category 1 = >12" to groundwater and non-sensitive
Category 2 - <12" to groundwater and non-sensitive
Category 3 = >12" to groundwater and sensitive
Category 4 = <12" to groundwater and sensitive

Source: ERDAS, Inc. 1981.

Category 3 lands are considered suitable for development with soil absorption wastewater treatment systems, but these lands display sensitive natural features which constrain the use of the land. Siting considerations (setbacks, land area requirements, use restrictions) and design requirements may affect the development potential by requiring special construction or site design features. Additional cost may reduce the development potential, but the added design features might also increase the desirability of the location (ocean-front, marsh view, etc.), thereby resulting in a higher return on investment. This category tends to include less than 20.0 percent of the total land in each study area except Carteret County where much of this category land has already been developed.

Environmental considerations are identified and described by the Coastal Management Program and include ocean hazard areas, natural and cultural resources, and public water supplies. Archeological and historical resources listed on the Historic Register are also identified. In addition, Registered Natural Areas as identified and designated by the North Carolina Department of Natural Resources and Community Development are included in the sensitive areas description of this category.

Table II.3 displays the development potential of each study area if soil absorption systems are utilized on those lands deemed developable (non-Category 4). Category 1 lands have full potential and Category 2 and 3 lands have partial potential as described previously. For discussion purposes, 25 percent of Category 2 and 75 percent of Category 3 lands are assumed to be capable of being developed using soil absorption systems. Table II.3 shows that at least two-thirds of developable land (Hatteras Island - 63.5 percent) in each study area can be developed using on-site or small community soil absorption systems.

Development potential on Category 4 lands is the lowest of the categories presented because of the development costs involved in meeting environmental standards and providing off-site wastewater management systems. In many instances the risk of developing in these areas is also increased as protected resources are often more prone to flooding and storm damage than those lands in Categories 1, 2, and 3.

(c) Land Capability Analysis: Population and Flows

The impact on development potential from the widespread use of soil absorption systems has been an ongoing issue in this EIS. The North Carolina Laws and Rules for Ground Absorption Sewage Treatment and Disposal Systems (effective July 1, 1982 and amended January 1, 1983) have been analyzed to determine what minimum lot sizes will be required for single family, townhouse and apartment dwelling units. A repair area is not required under the following conditions (.1945 (c)) for a lot:

1. Which is specifically described in a document on file with the local health department on July 1, 1982, or which is specifically described on a recorded deed or a recorded plat on January 1, 1983

2. Which is of insufficient size to provide a repair area equal in size to the original nitrification field as determined by the local health department

Table II.3 Development Potential with Soil Absorption Systems.

Land Capability Category 201 Plan	Category 1 (100%)	Category 2 (25%)	Category 3 (75%)	Acreage* Developable	Total Acreage in Categories 1, 2, and 3	% of Tota Acres Developab
Southwestern Brunswick Co.	1409	79	1049	2537	3121	81.3
Southeastern Brunswick Co.	2988	93	843	3924	4485	87.5
Topsail/Surf City	1074	226	871	2171	3140	69.1
Carteret Co.	1276	103	1005	2384	3029	78.7
Hatteras Island	2437	713	1356	4506	7095	63.5
Dare Beaches	4861	849	1429	7139	10,163	70.2
Totals	14,045	2,063	6,553	22,661	31,033	73.0

Category 1 = >12" to groundwater and non-sensitive
Category 2 = <12" to groundwater and non-sensitive
Category 3 = >12" to groundwater and sensitive

*This column represents the sum of those fractions of Category 1, 2 and 3 lands which can reasonably be expected to be developed using soil absorption systems.

**This column represents Column 4 divided by Column 5.

NOTE: Category 2 lands are assumed to be 25% developable if adjacent suitable soils are used for soil absorption systems.

Category 3 lands are assumed to be 75% developable under existing CAMA, cultural resource, and natural area regulations.

Use of Category 2 lands is based on siting soil absorption systems on suitable soils in Categories 1 and 3.

Source: Claude Terry & Associates, Inc. 1981.

3. On which a ground absorption sewage treatment and disposal system with a design daily flow of no more than 480 gallons is to be installed; or on which a ground absorption sewage treatment and disposal system with a design daily flow of more than 480 gallons is to be installed if application for an improvements permit is received by the local health department on or before April 1, 1983.

Thus, the 5,000 square foot lots platted prior to July 1, 1977, can still be developed with soil absorption systems but without a repair area. Lots of 7,500 square feet appear to be the minimum size that can be developed on sandy soils with a soil absorption system that includes a repair area. Townhouses can be developed at the density of six to eight units per acre depending upon the amenities package offered by the complex. Apartment units can range as high as 18-20 units per acre with no amenities. Appendix E in the DEIS contains diagrams of lot layouts and supporting text.

Each community will contain different percentages of these types of residential units. For planning purposes, 40 persons (or 20 bedrooms) per acre appears adequate for land consumption analyses.

Land acreages identified previously as suitable for development with soil absorption systems provide a mechanism for determining the carrying capacity of each 201 study area. Based on the number of housing units that can legally be accommodated by a given parcel of platted land (assume an average of five four-bedroom houses/acre) a maximum population can be projected. Table II.3 shows that developable acreage of highland using soil absorption systems ranges from 63.5 percent of available land in Hatteras Island to 87.5 percent in the Southeastern Brunswick 201 study area. If these developable acres were used for residential construction as permitted in the North Carolina Division of Health Services regulations governing on-site wastewater treatment systems, potential development can be quantified in terms of population and wastewater flows.

Figure II.2 contrasts the number of persons who could be served by soil absorption systems with the year 2000 peak population projected in the draft 201 Plans. As can be seen by these figures, the potential populations greatly exceed population projections.

The lack of centralized sewer systems should not preclude future growth, based on technical considerations. Other factors may affect development potential, however. Examples include downturns in the national and regional economies, depression of the housing industry, high interest rates, future shortages of gasoline, degradation of natural resource amenities by nonpoint source pollution, etc.

2. Environmental Impacts

The EIS process has identified four major areas of impact: surface water, groundwater, sensitive natural areas and land uses. This section discusses the environmental impacts on these areas and provides a summary of issues, existing conditions and impacts. A detailed description of existing conditions on the North Carolina barrier islands is contained in the Technical Reference Document, Environmental Inventory Report.

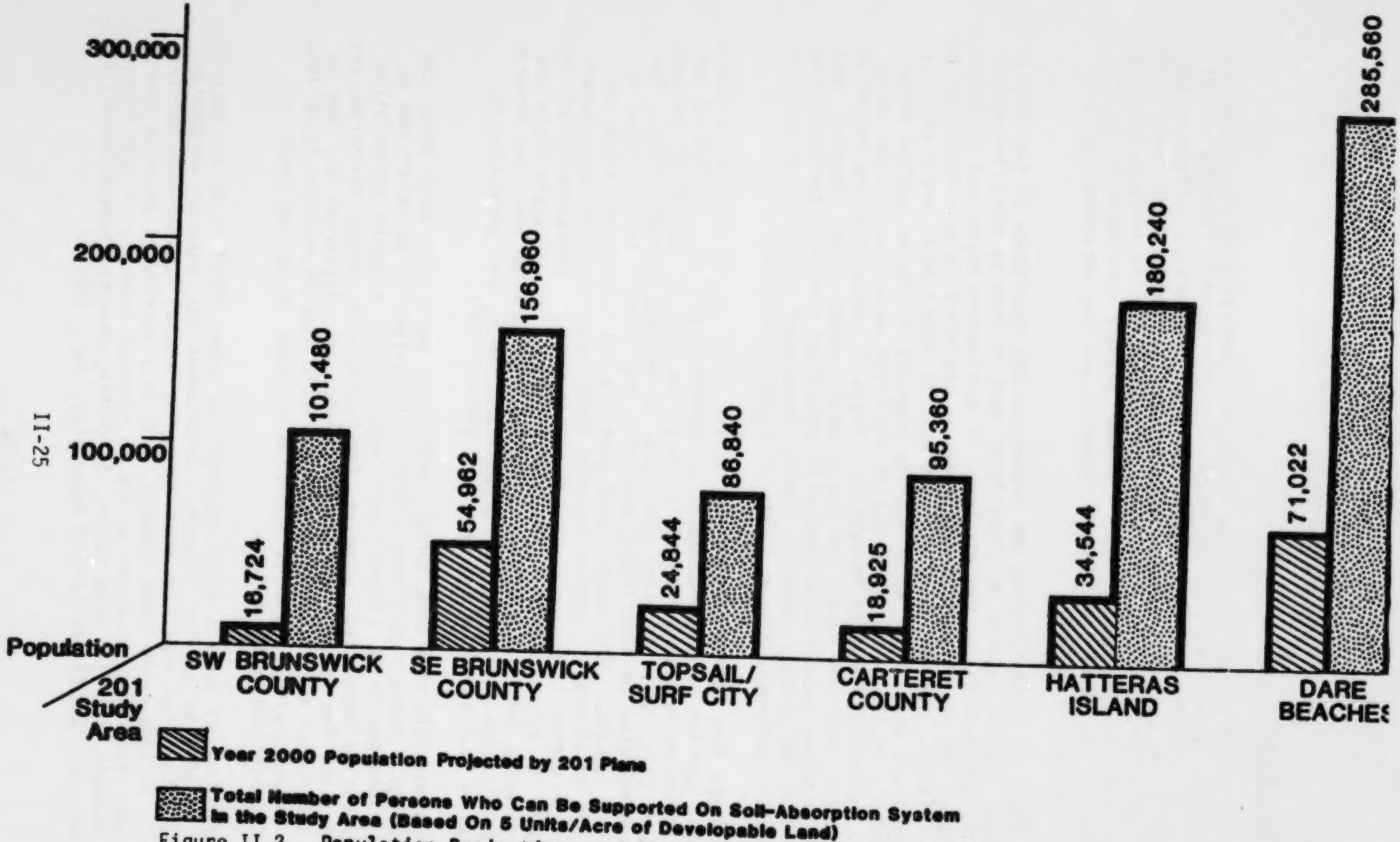


Figure II.2 Population Projections and Developable Land Comparison

Source: Claude Terry & Associates, Inc. 1981

(a) Surface Water

A major issue of the EIS is the impact of alternative strategies on the surface waters associated with the North Carolina barrier islands. It is difficult to overemphasize the resource value of the coastal surface waters. They provide recreational opportunities for boating, swimming and sport fishing. In addition, they support a large commercial fishing industry based on shellfish and finfish populations. Another primary consideration is the importance of the estuarine systems' dynamics and the dependence of many ocean finfish on the system.

The State of North Carolina has recognized the importance of the coastal waters near barrier islands by classifying most of them as shellfish waters (Class SA) and prohibiting the discharge of wastewaters regardless of treatment level. The use of surface discharges is therefore largely restricted on barrier islands. However, even with the most stringent water use classification, there are still major water quality problems in coastal surface waters. Approximately 46,170 ha (114,000 ac) of shellfish waters within the study area are currently closed to harvesting. Areas of concern include bacterial contamination, nutrient levels and heavy metal contamination. However, most of these problems appear to be generally associated with mainland activities such as land use changes, specific coastal areas such as marinas or discrete environmental phenomena such as flocks of migratory waterfowl.

Few cases have been documented of surface water pollution directly attributable to barrier islands wastewater management practices. A study of nutrient pollution resulting from man's use of the barrier islands was conducted at Surf City, North Carolina (EPA 1975, Shiver and Register 1978). The study concentrated on identifying pollution from septic tanks located on finger-fill canals. This study found that nitrogen compounds, total phosphorus and total organic carbon exceeded background counts in groundwaters and surface waters in proximity to the septic tanks. Contamination of the groundwater is attributed to the fact that the septic tank drain field was placed directly into the aquifer. Little or no separation was found between the nitrification field and the groundwater table, and adsorption of nutrients by soil particles was very poor (Shiver 1981).

It is possible that some surface discharges would also occur under the EIS Strategy. State regulations prohibit discharges to SA waters but do permit discharges to SC (fishery use) waters where adequate assimilative capacity can be documented. However, few future point source discharges are expected since few waters near barrier islands are classified SC. Due to costs, the number and volume of discharges would also be expected to be few. Current water quality standards would be expected to be met under all strategies examined by the EIS.

Degradation of surface water resources by urban runoff is an increasingly serious problem on barrier islands. Development has produced documented negative impacts on shellfish beds bordering several southeastern barrier islands. In some cases these impacts, initially attributed to point source discharges, have been shown to be due to nonpoint sources. A significant nearby example is Hilton Head Island, SC (USEPA, Gannett Fleming Corddry and Carpenter, Inc. and Claude Terry & Associates, Inc., 1981).

(b) Groundwater

A major issue associated with groundwater on the barrier islands is the potential contamination of shallow groundwater resources by on-site wastewater management facilities. Additional concerns include the potential impacts from land application sites, increased surface runoff and salt water intrusion.

The major value of groundwater is as a potable water supply. Groundwater is essentially the only on-island supply of freshwater for the barrier islands. However, groundwater is not generally a limiting resource south of Beaufort Inlet. Most public water supplies are obtained from the deeper limestone aquifer or from deep inland wells on the mainland in this southern area. Use of the barrier island surface aquifer for potable water purposes is not widely practiced, and instances of public water supply contamination by on-site systems have not been recorded on the North Carolina barrier islands. For example, Ocean Isle Beach, which uses the surface aquifer for part of its supply, has not shown any public health problem associated with septic fields in the area. Since ultimate disposal of treated wastewater is to the groundwater for most systems, groundwater quality and quantity remains a major issue in the EIS. However, if the probable use for the surficial aquifers on barrier islands is not potable water supply, the significance of the introduction of nitrates, bacteria and virus into the aquifer must be re-examined.

The EIS Strategy will result in continued discharge to groundwater. Use of upgraded surface and subsurface land disposal should reduce impacts of existing discharges to groundwater. An on-site management agency and the local health department could promote future systems being installed and managed properly. In addition, an agency or health department could detect and eliminate or upgrade existing sources of contamination. In areas where on-site systems are not suitable, the EIS Strategy will provide for the use of small community systems or other off-site disposal. In all cases DEM's groundwater standards must be met.

The quantity of groundwater is influenced by many factors including recharge from precipitation and effluent disposal and withdrawal for potable water use. In areas which use the surface aquifer as the potable water supply, the use of on-island land disposal techniques helps maintain the level of the aquifer. In areas where off-island water supplies are utilized, the use of on-island land disposal techniques can lead to a net gain in aquifer recharge.

This net addition could possibly result in physical contact between the water table and the bottom of drain field trenches in marginal installations causing septic tank soil absorption system malfunctions. This potential adverse impact was evaluated by applying the methodology described in Section 4.2.2.3 of the Technical Reference Document, Alternatives Development Report, to a hypothetical barrier island case study. The results from the study show that the response of the water table to wastewater disposal can be estimated and used to evalute the potential for water table contact with drain field trenches across a given section of island. The case study analysis indicates that this situation is not likely to be extensive and occurs only for very marginal installations.

In addition, EPA Region IV is conducting a study designed to demonstrate the use of a mathematical model that is the basis of this methodology. The study plan is included in the Appendix.

(c) Sensitive Natural Areas

A number of environmentally sensitive features occur on the barrier islands of North Carolina. A primary issue considered by this study is the potential impact on these sensitive areas, including ocean hazard zones, biologically productive coastal waters, wetlands, wildlife nesting areas, protected species, maritime forests, designated natural areas and significant historic/archeological sites. These features warrant particular consideration for qualities such as uniqueness, rarity, hazardous conditions, high ecological value and low tolerance to disturbance.

Environmentally sensitive areas have been discussed in detail in the Technical Reference Document, Environmental Inventory Report, along with the existing regulatory and legal structures which currently provide protection for some of these areas. These structures include the EPA 404 permit program, the National Pollutant Discharge Elimination System, the National Environmental Policy Act of 1969, North Carolina Environmental Policy Act of 1977 and the North Carolina Coastal Area Management Act. While some protection is provided by this framework, there are many environmentally sensitive areas which are not protected from private development. It is not possible for any of the strategies considered by the EIS to provide blanket protection to these areas.

Primary impacts to sensitive areas could occur during construction of wastewater management systems. The installation of collection systems, interceptors, ocean outfalls and septic tank drainfields could cause adverse impacts without careful siting of development and implementation of mitigative measures. Secondary impacts of growth in the form of increased urban runoff pose a greater danger to sensitive natural areas, however.

The EIS Strategy will lead to lower densities per developed acre than will implementation of the draft 201 Plans, and therefore more acres will undergo development to serve the projected population. This assumes the increase in population to be the same with and without a central/regional system. Such low density development may lead to low level degradation of the sensitive areas. However, low density housing has been constructed in forests on barrier islands such as Hilton Head, South Carolina and Saint Simons, Georgia without the unnecessary clearing of trees. No strategy will guarantee the protection of the environmentally sensitive areas. In fact, long term adverse impacts are anticipated to several environmental features under all strategies. However, the EIS Strategy would provide for the possible protection of many categories of environmentally sensitive areas through the planning process. The planning and management functions of the EIS Strategy would provide the necessary framework to correct existing pollution problems and avoid or mitigate future impacts.

(d) Land Use/Population

Land use and development densities will interact with projected population levels in several ways. It is generally assumed by state and local officials that the same numbers of persons will be attracted to the North

Carolina barrier islands regardless of what type wastewater management systems are provided. Higher residential densities with accompanying lower housing unit costs would likely result from the provision of central/regional systems. Although a given prospective purchaser might refuse to pay the higher housing costs of low density development, market demand in higher income brackets may be adequate to absorb the projected number of units proposed by developers under the EIS Strategy.

The second land use/population impact is the increase in urban runoff that will result from future development regardless of which strategy is implemented. The EIS Strategy would lead to lower density developments and less concentrated urban runoff would be anticipated. If the citizens of the area desire a management agency, this agency could serve to promote a series of best management practices to mitigate these impacts.

(e) Other Resources

No effects are anticipated on climate or air quality levels. Proper systems operations will eliminate odor problems. Construction noise is temporary.

Alterations to terrain are expected to be negligible. Original contours will be restored after construction. Properly installed and maintained soil absorption systems and land surface disposal systems are not expected to produce adverse impacts on soils.

Impacts to aquatic ecosystems are included in the discussion of surface water quality impacts.

Impacts to terrestrial ecosystems are included in the discussion of sensitive natural areas.

Because population levels will not differ significantly under the three strategies considered by the EIS, the communities' economic profile and demand for community services will be approximately the same.

3. Financial Impacts

The financial impacts to be evaluated are twofold. First and most important are overall total costs regardless of who is to pay (total present worth and/or total annual average). These are the prime cost criteria defined by EPA regulations. Second, it is necessary to evaluate local costs in terms of affordability. This considers distribution of costs (for example, grants received reduce local shares). EPA defines affordability in terms of percent of median household income for costs of proposed systems. This is the average cost for the average residential household. Projects which exceed the defined criteria are not necessarily prohibited, but they would call for special re-evaluation and procedures.

Financial impacts are a major area of concern in this EIS. Local financial bases are small, and questions have been raised in discussions with local officials and citizens about the ability of island communities to bear the capital and operation and maintenance costs of central or regional wastewater management systems. As a consequence, this section of the EIS explores in considerable detail the costs and local financial burden of a variety of on-site and small community soil absorption systems which might be alternatives to systems proposed by the draft 201 Plans.

A case study of a hypothetical barrier island was developed as a mechanism to simulate various cost scenarios. First, costs were developed for a variety of potentially appropriate technologies. Then, several service scenarios using these technologies were developed, and the costs of each were analyzed. Details of the case study are found in the Alternatives Evaluation Task Report; major points are summarized in the DEIS (pp. II-56 ff).

Typical household monthly charges were developed for the draft 201 Plans and various small community and individual on-site systems. A major concern of the EIS is how affordable are these monthly user charges.

Table II.4 shows estimated average family income in 1980 in the four counties making up the 201 planning areas. Median county income figures were not available, nor were figures for specific island municipalities available. As a general planning guideline, it appears that the maximum user charges for systems funded by 201 Construction Grants program monies should range between $18.74 and $24.82. Such figures will need further refining at the detailed planning level to relate them more specifically to the median income of permanent residents of each barrier island community.

Figure II.3 is a bar chart relating the typical household monthly charges of various wastewater management technologies in each study. A range of charges is shown for groups of technologies. Monthly charges with and without federal and state funding assistance are shown as appropriate. Individual on-site systems are assumed to be ineligible for funding assistance in this comparison. (Systems in place before December 1977 are eligible; future individual on-site systems are not eligible.)

Monthly user charges were calculated by dividing total annual user costs by 12. Local governments may chose alternative methods of distributing costs.

In all of the planning areas, the costs of the draft 201 Plans exceed the EPA user fee ceiling by a significant margin if no federal and state funds are available. Many of the small community systems and some of the modified individual on-site systems appear very expensive relative to the local resource base. The reader should not be misled regarding individual or community systems, however. The EPA percent of income criteria applies to the average cost to all households in the area. While a few residences might require the more expensive on-site systems, the average cost for the area should be determined and compared with the percent of income criteria. In such cases, on-site systems may be easily affordable.

Federal and state assistance, however, brings many small community systems down in cost into the affordable range. Monthly user charges for three of the five draft 201 Plans also fall below the EPA guideline ceiling. The Southeastern Brunswick County, Southwestern Brunswick County, and Hatteras Island proposed 201 Plans are significantly higher than the EPA guideline ceiling.

4. Implementability

Difficulties in implementing the strategy can be anticipated mainly in the areas of financial and institutional arrangements. The limited

Table II.4 Average Household Income and Maximum User Charge per Household by 201 Study Area County.

County	1980 Population	1980 Housing Units	Persons/ Household	1979 Per Capita Income**	Estimate Ave. Countywide Household Income	Maximum User Charge /Household***	
						Annual	Monthly
Brunswick	35,377	12,409	2.85	5,598	$15,954	$239.31	$19.94
Pender (Topsail/Surf City)	21,537	7,511	2.87	5,224	14,993	224.90	18.74
Carteret	39,324	15,128	2.60	6,545	17,017	297.80	24.82
Dare	13,169	5,359	2.46	6,559	16,135	242.03	20.17

*U. S. Department of Commerce. Bureau of Census. 1981. 1980 Census.

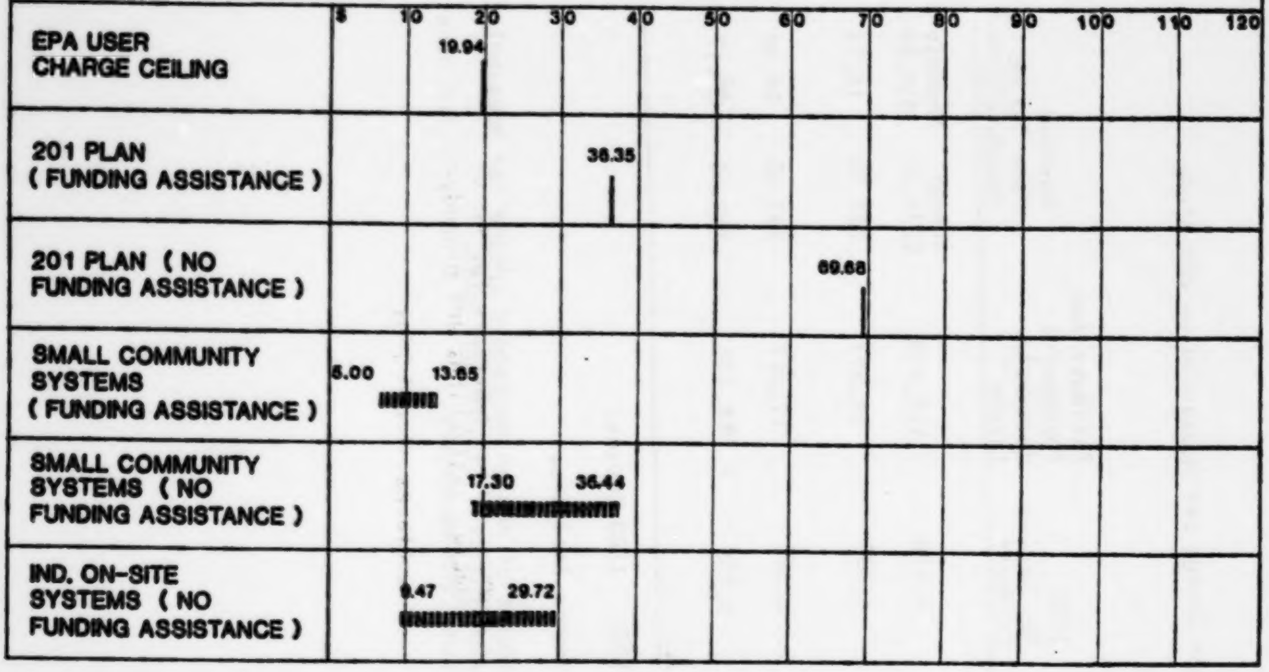
**U. S. Department of Commerce. 1979. Bureau of Economic Analysis.

***EPA regulations set a maximum user charge of 1.5 percent of median household income for households of $10,000-17,000 per year and 1.75 percent for households over $17,000 per year. If costs are higher, special evaluations and procedures are necessary.

Source: Claude Terry & Associates, Inc. 1981.

FIGURE II.3

SOUTHWESTERN BRUNSWICK COUNTY
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP



SOUTHEASTERN BRUNSWICK COUNTY:
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP

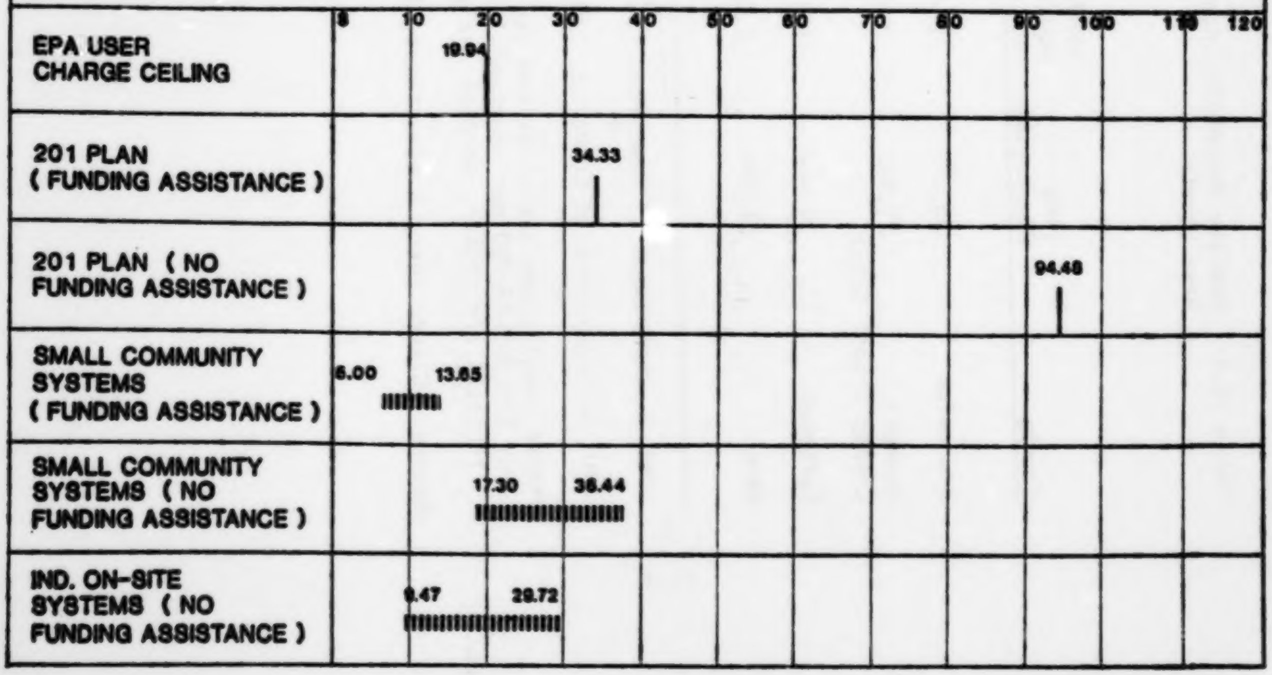
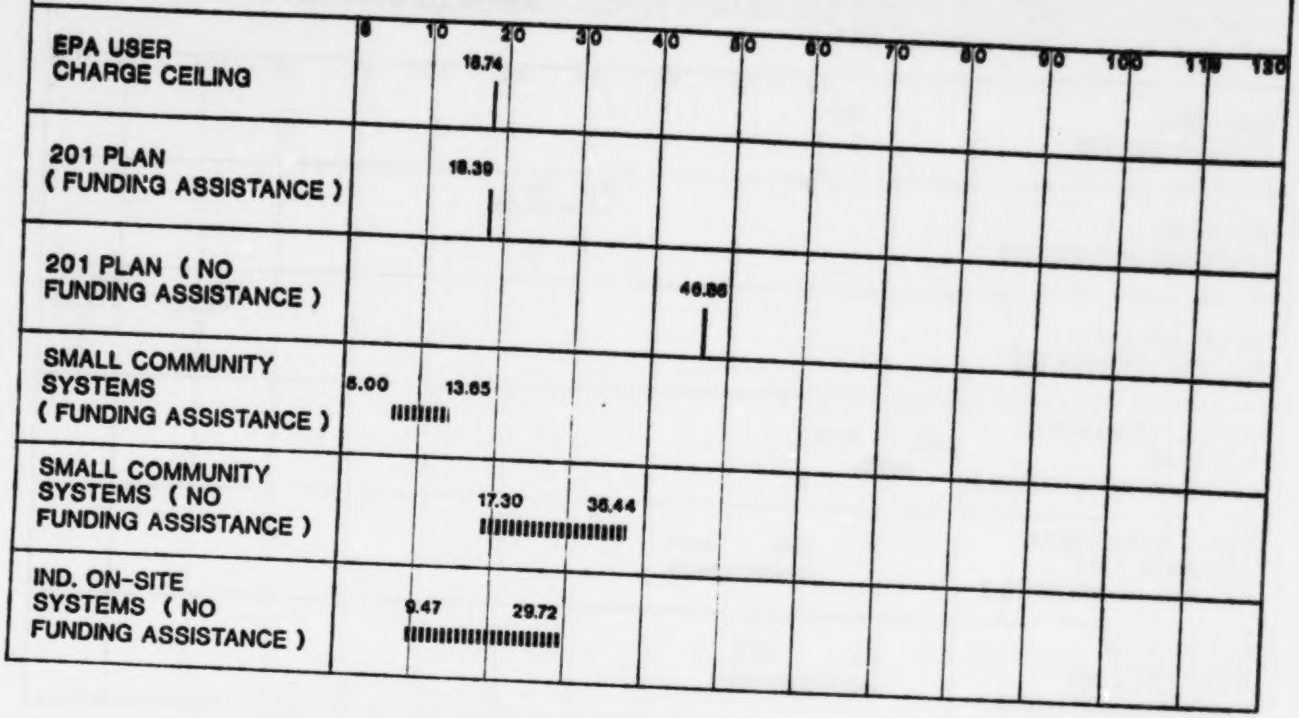


FIGURE II.3 (CONT.)
TOPSAIL / SURF CITY:
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP



CARTERET COUNTY:
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP

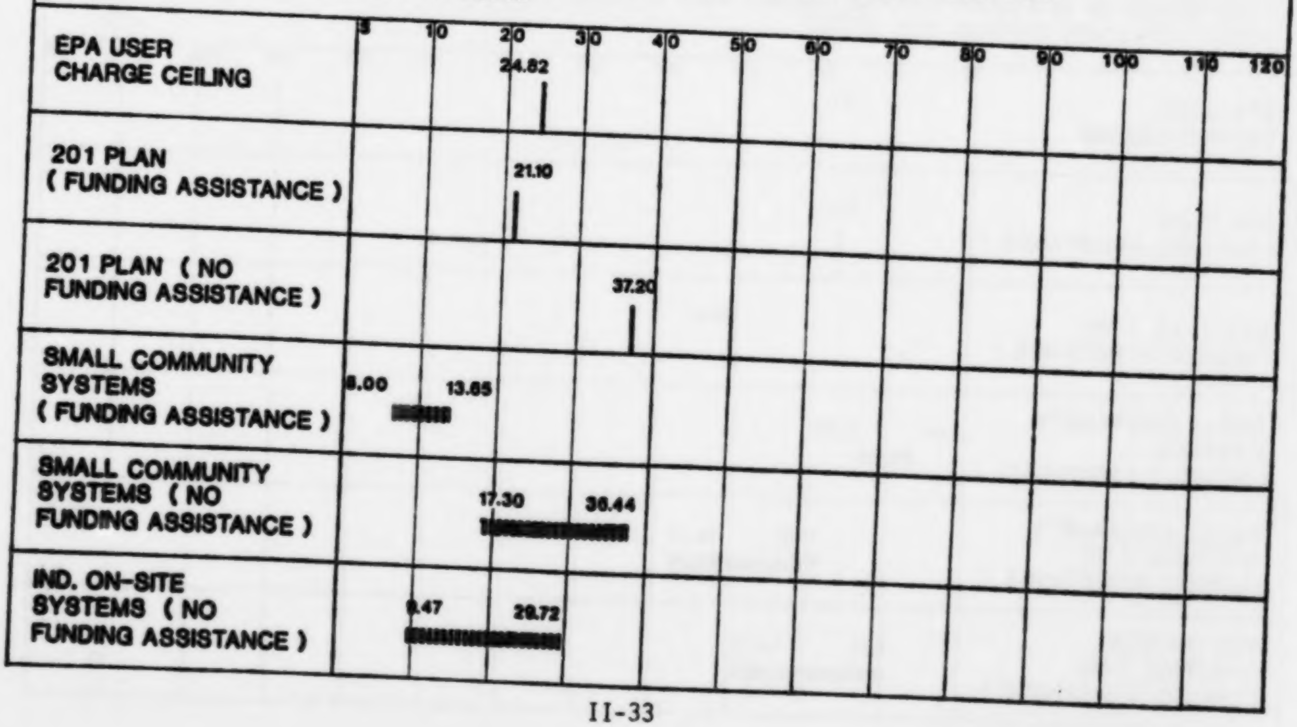
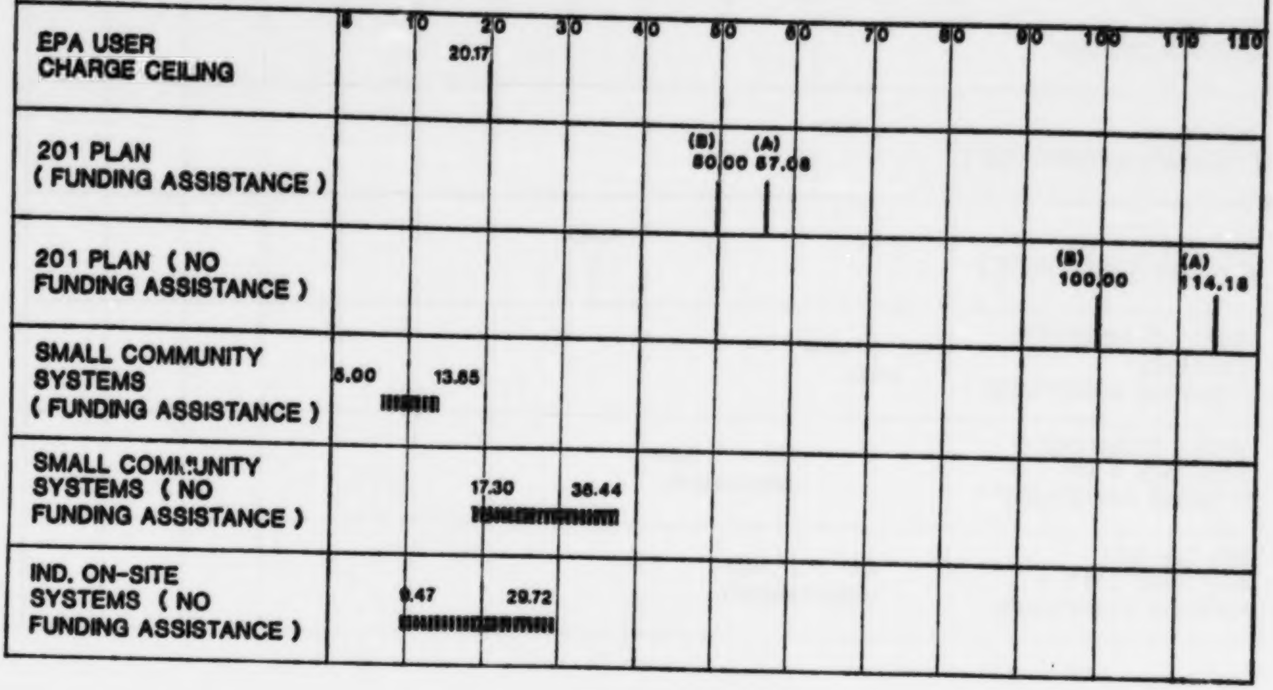
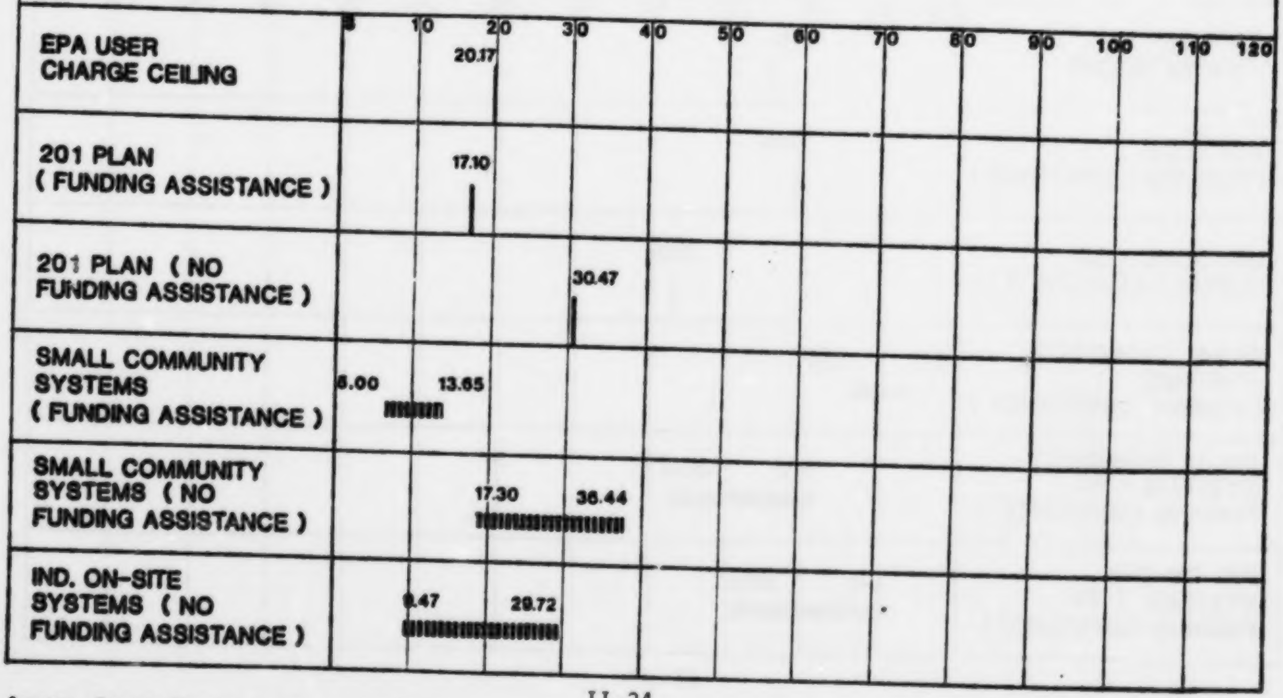


FIGURE II.3 (CONT.)
HATTERAS ISLAND: A) Avon/Buxton/Frisco/Hatteras B)Rodanthe/Waves/Salvo
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP



DARE BEACHES COMPLEX:
COMPARISON OF EPA USER CHARGE CEILING WITH TYPICAL HOUSEHOLD COST PER MONTH FOR EACH TECHNOLOGY GROUP



Source: Gannett Fleming Corddry and Carpenter, Inc. 1981 resources of local governments to meet the wastewater management needs of highly fluctuating seasonal populations are the major constraint. The provision of central or regional wastewater treatment systems, even with federal and state assistance, may prove to be beyond the financial capacity of some of the barrier island communities given the existing tax base and presently incurred debt service obligations. A decentralized approach to wastewater management which emphasizes the continued use of on-site and small community systems poses significantly less financial risk to local governments and will be relatively easy to implement.

Based on the expected federal 201 program funding for the next four years, the highest ranked community would not expect funding until 1987 or later depending on availability of funds. The remaining communities are considerably lower on the North Carolina Department of Environmental Management's list. However, a special situation exists where innovative and alternative wastewater management systems are proposed for use in a 201 study area. The federal government has designated four percent of the total amount of 201 funding for use on innovative and alternative systems. Therefore, if a 201 Plan had a low ranking and had completed all information requirements, and in addition was an innovative or alternative system, the project could be funded before higher priority conventional sewer projects. Communities that can demonstrate innovative solutions to wastewater treatment problems would therefore be more likely to obtain 201 project funding if and when further grants are approved. Such decisions will be made by the North Carolina Division of Environmental Management.

Implementation of the EIS Strategy involves updating the draft 201 Plans. The update program will address population, land use, flows, system selection, and institutional and financial arrangements. In several 201 planning areas the selected alternative could be a combination of on-site soil absorption systems and small community systems. In large part, this scenario represents a continuation of present practices and as such poses no barriers to implementation. The present mix of on-site and small community systems could shift toward a higher percentage of small community systems to serve an increased density of development.

Financial arrangements should not present as great a potential barrier to implementation under the EIS Strategy as would be the case if the draft 201 Plans were implemented as presently proposed. Total project costs should be smaller, and some of the systems may be eligible for innovative and alternative system funding of grant-eligible portions. Again, however, each community's place on the state priority list could cause delays in implementation.

A condition of receiving 201 Construction Grant money would be the requirement that local governments establish public on-site and small community wastewater management agencies where such systems are selected. Such agencies have been established elsewhere in the country and may offer benefits. The Clean Water Act, EPA regulations and program requirements memoranda (particularly PRM #79-8) require that applicants for construction grant money to fund such systems establish public management agencies.

- Establish a comprehensive program for regulation and inspection of on-site systems that will include periodic testing of existing potable water wells and, where a substantial number of on-site systems exists, more extensive monitoring of aquifers

- Certify that a public body will be responsible for the proper installation, operation, and maintenance of the funded systems
- Obtain assurance of unlimited access to each individual system at all reasonable times for inspection, monitoring, construction, maintenance, rehabilitation, and replacement.

Several months would likely be required to establish such agencies, but this task does not represent a barrier to implementation. The Alternatives Evaluation Task Report contains case studies describing the activities of several of these existing agencies which could serve as models for barrier island communities, if desired.

C. Mitigative Measures

Measures are suggested below to mitigate the significant adverse impacts which have been previously identified. These measures are intended to supplement existing development controls such as zoning ordinances, subdivision regulations, the Coastal Area Management Program and the National Flood Insurance Program. Many of these measures would be the responsibility of the local management agency.

1. Surface Water

- Conduct additional sampling programs so as to adequately document the extent and sources of water quality pollution in shellfishing waters.
- Renovate any known failing soil absorption systems and establish mechanisms for early identification of incipient failures.
- Assure routine inspection and pumping of soil absorption systems on a community-wide basis so as to reduce failures.
- Control runoff from developed and developing areas by greater use of on-site retention facilities and avoid storm sewering and curbs and gutters.
- Control discharges from bilges and sanitary facilities of commercial and pleasure boats, particularly within estuarine and marine waters. More stringent enforcement of Coast Guard regulations is required.
- Minimize the use of impervious surfaces in new development.
- Preclude surfacing of septic tank effluent and overland flow by proper installation, operation and maintenance of soil absorption systems.
- Implement or enforce best management practices for all new construction.

2. Groundwater

- Implement a water conservation program to reduce hydraulic loading on soil absorption systems. Increase public education and modify local plumbing codes.

- Establish a monitoring network to assure detection of any contaminated groundwater or saltwater intrusion in potable water supplies or surface water bodies.
- Use the groundwater modeling tool developed by the Draft EIS to predict the hydrodynamic response to soil absorption disposal of wastewater. This model is being demonstrated through additional studies now underway (see Appendix).

3. Sensitive Natural Areas

- Encourage developers to refrain from unnecessary clearing of vegetation, especially in maritime forests, so as to preserve wildlife habitat and decrease urban runoff.
- Encourage buffer zones and greenbelts to preserve open space and reduce noise impacts on wildlife and humans.

D. Implementation of the Recommended Strategy

The Construction Grants program was delegated by EPA to the Division of Environmental Management (DEM) of the North Carolina Department of Natural Resources and Community Development in 1980. EPA makes annual grants to DEM for distribution to local grant applicants according to the state-developed funding list.

Based on the delegated authority, DEM certifies 201 plans when they are completed and prepares a Finding of No Significant Impact (FNSI). EPA then reviews the FNSI and provides for a 30-day comment period on the FNSI. If no negative comments are received, EPA approves the FNSI, and DEM issues a final approval of the grant application. At that point, the grant applicant may receive funds subject to his position on the funding list and availability of funds.

Before developing a work plan to update their draft 201 Plans, grant applicants should be aware of recent changes made to the Construction Grants program, the criteria used by the state to develop its priorities and funding list and the present potential for each barrier island grant application to receive 201 monies. Each of these topics is discussed below.

1. Recent Changes to the Construction Grants Program

Certain procedural and administrative aspects of implementing the Clean Water Act of 1977 were altered by the provisions of the Municipal Wastewater Treatment Construction Grants Amendments of 1981, enacted December 29, 1981, and its implementing regulations published as an interim final rule in the *Federal Register* on May 12, 1982. Guidance is furnished in an EPA publication, *Construction Grants 1982* (CG-82) (EPA 1982). Highlights of the changes effective October 1, 1984, are as follows:

- EPA funding of conventional wastewater management systems will drop from 75 percent of grant-eligible components to 55 percent. Funding for innovative and alternative systems or components will be reduced from 85 percent to 75 percent.

- Grant-eligible components are restricted to intercepting sewers, wastewater treatment facilities, outfall sewers, and infiltration/inflow rehabilitation. Collection systems and correction of combined sewer overflows will no longer be eligible routinely, except that the governor may choose to use up to 20 percent of the state's allocation for these previously eligible components.

- Eligible treatment capacity will be based on existing population at the time of the Step 3 grant award or planning area population in 1990, whichever comes first.

- Step 2 grants will no longer be made separately. Instead, Step 3 grants will contain an allowance for design, plans and specifications. Small communities may apply for an advance on this allowance.

2. Development of the North Carolina Construction Grants Funding List

DEM prioritizes grant applicants and maintains a funding list for the administration of its 201 program. Communities are placed on the list if they meet one or more of the following criteria:

- Water quality problems are documented.
- An application for an EPA or state grant is on file.
- The community is under orders by the NC Environmental Management Commission to initiate construction within the year or to hook on no new flows.
- If the existing treatment facility provides only primary treatment or less.

Communities are ranked based on the number of points assigned to their project. The scoring system is described in detail in 15 North Carolina Administrative Code 2F.0100. Factors considered include:

- Water quality impacts
- Area population
- Basin impacts
- Water use restoration factor (use attainability considerations)
- Size of proposed facility
- Urgency of the need to upgrade services
- Existing degree of treatment provided
- Community's compliance schedule, if any
- Regionalization: percent of planning area to be served, number of municipalities served, size population to be served, and availability of any agency adequately authorized to provide wastewater management services.

The community's rank on the funding list is dictated by its score: the higher the score, the higher the place assigned on the funding list. A community moves up the funding list as preceding projects receive approval of their 201 plans and grants are made.

The funding list is developed each year according to the following schedule:

January:	Start the update process in the regional offices
February 15:	DEM Raleigh receives update information
April:	Draft funding list developed
June:	Public hearing held on draft list
July:	Draft list approved by DEM
August:	Draft list transmitted to EPA Region IV for review
October 1:	Effective date for new funding list

3. Barrier Island Communities' Potential for Receiving 201 Funds

According to the draft FY '84 funding list, the Barrier Island draft 201 Plans are ranked as follows:

Plan Name	Rank	Est. Funding Year
Southwestern Brunswick Co.	219-221	FY 1988
Southeastern Brunswick Co.	Not listed	
Topsail/Surf City	116	FY 1987
Carteret Co. Complex	115	FY 1987
Dare Co. Complex	114	FY 1987

These rankings were assigned prior to the completion of this EIS and the completion of the update program defined by the EIS Strategy. It is not likely that rankings will change after the 201 plans are updated (Batten 1982). In the case of the draft Southeastern Brunswick County 201 Plan, Southport was allowed to proceed to serve its own needs and is ranked as #80 on the list with funding estimated in FY 1986. The barrier island communities of Long Beach, Yaupon Beach, and Caswell Beach do not constitute a project and thus have no ranking (Batten 1983).

4. Schedule of Grant Applicant Activities

DEM has defined the following schedule of activities to be undertaken by barrier island communities in updating the draft 201 Plans (Batten 1983):

- The grant applicant will send DEM a plan of study for the update project.
- DEM will review the plan and approve the tasks to be undertaken.
- The community will negotiate with its engineer to establish the study's cost and apply for an increase in its original Step 1 grant.
- The Environmental Management Commission will approve the increase if funds are available. (The state no longer makes new Step 1 grants but can increase old Step 1 grants.)
- The community completes its update program and goes through the standard Step 1 review and approval procedures.
- The community applies for an advance on its Step 3 monies to undertake the design phase.
- When plans and specifications are approved by DEM, Step 3 monies will be granted as available.

III. COMMENTS ON THE DRAFT EIS AND EPA RESPONSES

EPA conducted three public hearings in North Carolina coastal communities to present the Draft EIS and gather comments. The dates and locations included Bolivia on August 23, 1983, Pine Knoll Shores on August 24, 1983, and Manteo on August 25, 1983.

This section of the Final EIS contains letters of comment and EPA's responses to them, followed by the transcripts of the three public meetings and EPA's responses. Indexes are provided for both types of comments. A separate index precedes the written comments; an index to each transcript appears on the first page of each transcript. Substantive comments on the letters and transcripts are bracketed and numbered sequentially. The prefix "W" refers to a written comment; the prefix "T" refers to a comment in a transcript.

A. Written Comments

The following index to the written comments is provided to facilitate locating specific letters.

Comment	Name	Agency
W-1 → W-5	S. M. Rogers, Jr.	UNC Sea Grant College Program Marine Advisory Services N.C. Marine Resources Center
W-6	Don L. Klima	Advisory Council on Historic Preservation
W-7 → W-16	Craig Cogger	School of Agriculture and Life Sciences North Carolina State University
W-17	John J. Little	Div. of Archives and History N.C. Dept. of Cultural Resources
W-18	Robert G. Stryker	N.C. Saltwater Fishing Federation
W-19	Frank S. Lisella	Public Health Service Centers for Disease Control
W-20 → W-24	Ray Sturza	Town of Kill Devil Hills
W-25	Robert N. Vinay	The Raleigh Salt Water Sportfishing Club
W-26, W-27	LaDane W. Bullington	Town of Ocean Isle Beach
W-28 → W-32	Paul S. Denison William E. Burnett	Henry von Oesen and Associates
W-33	Wayne A. Hanson	Corps of Engineer, Wilmington District Department of the Army
W-34 → W-38	Bruce Leighty	National Wildlife Federation

Comment	Name	Agency
W-39	George C. Norris	Soil Conservation Service U.S. Dept. of Agriculture
N/A	Chrys Baggett	State Clearinghouse N.C. Dept. of Administration
W-40	John J. Little	Div. of Archives and History N.C. Dept. of Cultural Resources
W-41 → W-47	Anne Taylor	N.C. Dept. of Natural Resources and Community Development
W-48 → W-74	James H. Lee	Office of Environmental Project Review U.S. Dept. of the Interior
W-75	Larry Bray	Outer Banks Chapter National Audubon Society

UNC SEA GRANT COLLEGE PROGRAM
MARINE ADVISORY SERVICES

N.C. Marine Resources Center
Kure Beach, N.C. 28449

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August 8, 1983

Mr. W. Bowman Crum, Jr.
EIS Project Office
Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30365

Dear Mr. Crum:

Please consider the following comments on the NC Barrier Islands Wastewater Management Draft Environmental Impact Statement (EIS). While I have reviewed the entire EIS, its length precludes detailed comments. My comments are limited to overall impressions and the more serious differences of opinion.

1 The EIS does not adaquately address many of the concerns expressed in my earlier correspondence dated 13 April 1981 and 6 November 1981. Barrier islands are still portrayed as narrow low sand spits rapidly migrating towards the mainland and frequently cut by new inlets. While gradual erosion problems are significant, most of the barrier islands in North Carolina have not been found to be significantly migrating by overwash processes as presented in the EIS. Contrary to the EIS, within the design lifetime of new development and any of the wastewater treatment alternatives, the threat of a new inlet opening is highly remote along most of the islands and is usually not an important consideration in design. Furthermore, when an inlet is opened it will most likely be caused by ocean storm surge and waves moving inland to breach the island. The only exception is along Pamlico Sound where the size of the storm surge in the sound makes a breach possible from either direction.

2 Barrier island as well as mainland barrier beaches experience particular hazards due to storms and long term erosion not common in other areas. The severity and extent of those hazards is highly dependent on the shoreline topography and the design storm conditions. The EIS does not offer adaquate assistance in selection or siting of the appropiate alternative methods of wastewater treatment. The tables comparing the levels of damage susceptibility are distorted by the overly simplistic view of barrier islands mentioned earlier.

3 While boats and boats in marinas are an obvious and highly visable potential source of pollution, to my knowledge, no detailed study has been able to clearly isolate boats as "a major contribution to the closure of shellfish waters" in the EIS Environmental Inventory Report, 2.12.4, page 2-18. Many marinas are located in enclosed basins with reduced circulation, which, by their nature, accumulate

The University of North Carolina is comprised of the sixteen senior institutions in North Carolina.

pollution from failing septic tanks, industrial discharges, surface runoff and the other various sources including boats. In those detailed studies where efforts were made to isolate all of the various sources of pollution, boats were not found to be the major contributors. Although boats are potential sources of pollution it is not conclusive that they are a significant actual source. The vast majority (roughly 98%) of boats registered in NC are too small to have marine toilets. Among larger boats, the majority, (roughly two thirds) are not in use even on the busiest summer weekends. When in use, they are not usually in the marina. Untreated discharge of sewage from all boats in inland waters has been in violation of federal statutes since 1980. Compliance with those regulations has been less than total, but many boats now have installed marine sanitation devices to treat or hold waste to meet federal standards. Marinas often have available on-land facilities as an alternative to using marine toilets in the marinas. 3

The study of several Brunswick County marinas by Bane and Walker, concluded only that there were higher coliform counts near the marinas. It does not conclude the source of the higher counts and in fact reports "a low correlation was observed between boating activity and fecal coliform counts". The EIS conclusion that boats in marinas are a "major contribution" to shellfish closures is not supported by existing studies.

After reviewing the draft NC Barrier Island Wastewater Management EIS, my impression of the major findings are the following: 1) Low density communities should seriously evaluate alternative wastewater management technologies including on site treatment rather than assumethat regional collection and treatment systems are always more effective. 2) Better financial planning is advisable to determine realistic construction and operation expenses earlier in the planning process. I do not disagree with these findings. However, the major efforts of the EIS are in no way unique to barrier islands but are in fact common to every inland community with low density areas of developement where a wastewater treatment system is considered. 4 It remains unclear to me why so much effort and project delay has been directed at barrier island communities when the primary EIS concerns are equally appropriate in all communities nationwide.

There are unique problems for wastewater treatment methods on barrier islands as well as mainland barrier beaches. In my opinion, the effect of coastal storm hazards and long term coastal erosion on wastewater treatment has never been adaquately addressed. Unfortunately, the EIS offers no assistance for communities, designers, or EPA to evaluate the effect of storm hazards and long term erosion on proposed wastewater systems. 5 The natural hazards for development on barrier islands are not explained in sufficient detail. The susceptability for damage to components of the various wastewater treatments are not evaluated adaquately. Shorelines with different topographies and different locations relative to the shoreline will experience differing coastal hazards. The draft EIS does not significantly address the issues that are of most importance to barrier island communities. 5

Sincerely,

S. M. Rogers Jr.

Spencer M. Rogers, Jr.
Coastal Engineer

Enclosures

ENVIRONMENTAL ASSESSMENT BRANCH
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EPA-REGION IV
ATLANTA, GA.

Barrier dynamics and landward migration with Holocene sea-level rise

Stephen P. Leatherman

Department of Geography, University of Maryland, College Park, Maryland 20742, USA

Barrier beaches (islands and spits) have become the subject of mounting interest[1,2] due to human development on these landforms. It is commonly thought that barrier beaches continuously migrate landward in response to sea-level rise, often by overwash processes, maintain mass through time, and that these processes are occurring at a rate commensurate with human (100 yr) time frames. While some barriers are naturally migrating quite rapidly[3,4], other barriers decidedly are not. Here I present data which illustrate that many US Atlantic Coast barriers are not evolving over the short term in accordance with generally accepted hypotheses and argue that the presumed norm may actually be the exception.

Geomorphical and historical evidence shows that most barriers are presently experiencing seaside erosion. In fact, shore erosion is a prevailing worldwide phenomenon along sandy coasts, except where ample sand supplies are readily available[5]. Initiation of the current transgressive phase is not precisely known, but most scientists agree that it began within the past 200 yr (refs 6,7). The forcing function for landward shoreline retreat is sea-level rise[8,9].

Prevailing theory holds that barrier response to sea-level rise is landward and upward migration through time[10,11] (Fig. 1). Without sand movement from the ocean beach to the bayshore, the barrier feature would be forced to drown in place[12]. Proponents of the overwash hypothesis[13] argue that overwash is the principal process of landward migration, maintaining barrier integrity and relative elevation with respect to a rising sea. More recently, the predominant role of inlets in landward sediment transfers has been recognized[14,15].

There is geomorphic logic for this theory of barrier dynamics, but the precise mechanisms and rates for barrier rollover have not been properly assessed. Much speculation exists on this point at present; for instance, some scientists[16] envision that barrier translocation can occur extremely rapidly (within 50–100 yr). Implicit in their basic argument is that barriers move as a virtual unit with conservation of mass.

Quantitative studies (ref. 17 and work in preparation) have shown that many barriers are actually eroding on both sides and experiencing bayside submergence. Fire Island (Fig. 2), a barrier island along the south shore of Long Island, New York, has been studied in detail (refs 18, 19 and work in preparation). Geomorphic information from >100 shallow vibracores indicate that the western half of the island has been relatively stable in its centroid position during at least the past millenia. Radiocarbon dates on *in situ* salt marsh peat deposits yield ages greater than 1,000 yr at relatively shallow depths (1.5–2.5 m below ground surface) near or at the barrier bayshore. As the depth of the enclosed bay (Great South Bay) ranges from 1.2 to 3.0 m, it appears that essentially no landward migration has taken place in this section of Fire Island during this time period[19].

Stratigraphical correlation of dated peat layers at depth along bay to ocean transects also show that the salt marsh was displaced seaward during the past 500 yr. If the barrier were experiencing little or no landward migration, then sea-level rise would cause submergence of the backbarrier flats, which would be reflected in the stratigraphical record as seaward encroachment of salt marshes towards the barrier nucleus. Other geomorphic evidence, including truncated inlet ridges and tree stumps *in situ* on the barrier bayside, provide conclusive evidence of bayside erosion and barrier submergence.

Landward barrier migration is a time-averaged phenomenon due to sporadic and site-specific storm-generated events over the long term. Radiocarbon dating of peat deposits encountered at depth show a discontinuous record of deposition. For instance, at one site along Fire Island (Fig. 2, point A) only 0.8 m of sediment were deposited between 1,350 and 350 yr BP, while 1.1 m of sediment accumulated during the past 350 yr. Other cores containing datable material illustrate similar chronologies and sequences. This barrier island is clearly not continuously migrating landward during human (<100 yr) time frames in response to sea-level rise.

The historical record confirms and provides detail on this geomorphic trend. Quantitative shoreline mapping shows that between the 1830s and 1979 bayside erosion equalled ocean-side erosion along some sections of Fire Island (Fig. 2). Therefore, the barrier is eroding from both sides, narrowing through time, rather than migrating landward. Previous studies at Assateague Island, Maryland[15] showed that barriers must narrow to some critical width before initiation of migration. In the case of Assateague, emplacement of updrift jetties has sand-starved the northern end of this island, resulting in extremely high erosion rates exceeding 10 m yr^{-1}. This artificially-manipulated island continued to erode in place until the critical barrier width (200–250 m in this locality) was reached. At this point overwash is effective in transporting enough material over the island to compensate for shoreline losses so that a low, narrow barrier is being maintained with landward translocation. While ephemeral inlets and overwash to a lesser degree are effective in barrier rollover in these special conditions, the island section so affected has apparently not maintained mass as it has been drastically reduced in subaerial size with migration.

Quantitative studies along the Outer Banks of North Carolina (ref. 17 and C. Everts, work in preparation) confirm the Fire Island results and indicate the general applicability of these findings to a wide geographical area. During a 94-yr period (1852–1946), there was no substantial sand deposition along the bayside by overwash processes, and the barrier experienced both ocean and bayside erosion along much of its length. There was also a general decrease in total subaerial landmass such that the island is continuing to narrow through time and is apparently not maintaining volume. Due to the relative rise in sea level, Hatteras Island, North Carolina, is being submerged, producing favourable conditions for salt marsh growth towards the barrier nucleus; significant new salt marshes have developed

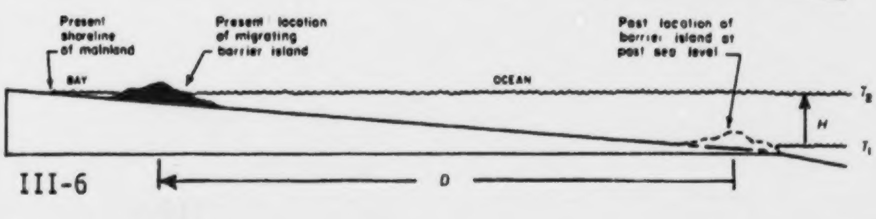
Slope of coastal plain and continental shelf
Past shoreline of mainland
Past location of barrier island
BAY
OCEAN
T_1
Present shoreline of mainland
Present location of migrating barrier island
Past location of barrier island at past sea level
BAY
OCEAN
T_2
H
T_1
D

Fig. 1 Within a geological time frame, barriers must migrate landward or be drowned in-place with sea-level rise. Large-scale barrier migration is associated with small increases in sea level due to the low, gradual slope of the coastal plain. This article defines the short-term dynamics of this long-term, time averaged phenomenon. *H*, rise in sea level; *D*, horizontal migration of barrier island where *D* is 100–1,000 times *H*; T_1, past sea level; T_2, present sea level.

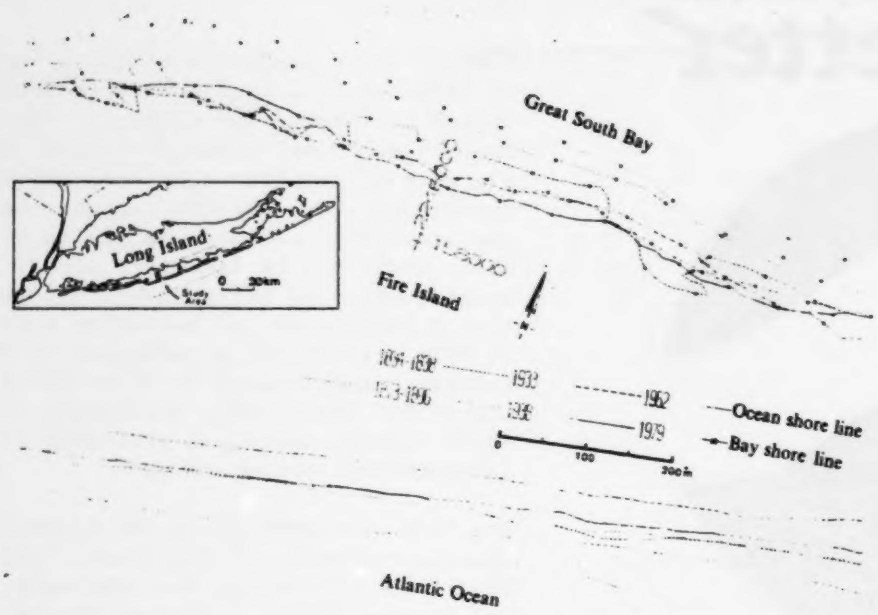

Fig. 2 A new, automated technique of mapping was utilized to generate this computer-plotted representation of the ocean and bay shorelines for the Sunken Forest area of Fire Island, New York (located at Point B on insert). The barrier centroid has remained essentially static during the past 150 yr as both shorelines exhibit an erosional trend.

on the backbarrier flats by seaward expansion. By comparison, overwash processes have been largely insignificant in providing new sandy substrate for salt marsh colonization. Note that this microtidal barrier system has been cited as a classic washover barrier[13,16], wherein overwash was believed to be chiefly responsible for landward migration and salt marsh development during short time frames (<100 yr)[20]. In practice, coastal investigators have often relied on qualitative data and observations of local events to formulate general models of barrier migration without recognition and full appreciation of transport mechanisms and time frames.

It is clear that barriers, such as Fire Island, New York and Hatteras Island, North Carolina have been essentially static for quite a long period of time (up to 1,000 yr), and migration is dominated by aperiodic inlet breaching[15] occurring in a discontinuous step-like fashion. The evidence presented here has been derived from the well-studied US Atlantic Coast barriers, but these findings may have worldwide application in similar environmental settings.

It is not certain whether the present rise in sea level[21] is a momentary upward blip on an essentially flat curve or the initiation of a major, long-term transgression. What is becoming increasingly evident is that many islands are eroding on both sides, not actually migrating as popularly believed. These barrier beaches will probably continue to 'slim down' for at least some time in the future; even if sea level stabilizes, the time lag in response variables will entail erosion and submergence for a period lasting from at least decades to a century.

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in this issue

MSDs NO HELP ON WATER QUALITY
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EXTENSION OF SHELF LIFE OF FRESH FISH FOCUS OF PROJECT
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SEAL CENSUS UNDERWAY AGAIN
WIRE, ROPE SPLICING WORKSHOP OFFERED
URI MARINE LOG
IN PRINT

MSDs NO HELP ON WATER QUALITY

Regulations requiring boats to install marine sanitation devices (MSDs) to treat sewage appears to have been a costly requirement which is not likely to produce any significant upgrading of water quality, say Rhode Island researchers.

A local study conducted in the summer of 1980 surveyed boat owners in Rhode Island to examine the effect of MSD operation on environmental quality and the cost of compliance by boat and marina operators. "Our results suggest that the amounts of effluent generated by boats would not be likely to affect water quality of Narragansett Bay and that installation and operation costs of MSDs are not being reflected in an increased improvement in water quality," stated Dr. Niels West, University of Rhode Island, associate professor of geography and marine affairs.

Dr. West was assisted in the study by Charles Heatwole, of the Hunter College Department of Geology and Geography, and Lindsey Smith, a student in the URI Department of Geography and Marine Affairs. Their results will appear this spring in the Coastal Zone Management Journal.

MSDs were required on boats after January 30, 1980, when legislation made it illegal to pass untreated human wastes from boats into the water. Types 1 and 2 MSDs treat sewage chemically before it is released into the water. Type III MSDs, much less expensive to purchase initially and favored by the boaters surveyed, are holding tanks which are pumped out to land-based receiving tanks and treated in sewage systems.

Since no environmental impact of this legislation was conducted prior to passage of the law, Dr. West decided to examine the benefits of the law to Narragansett Bay and its boaters. The criterion chosen to measure the effectiveness of MSDs was the amount of BOD (biological oxygen demand) required to break down the effluent discharged. In a worst-case approach, Dr. West used the estimate of sewage produced per person ashore, much higher than would be generated by boaters, in his calculations. He then determined that the maximum potential daily discharge to the Bay would total 3,018 pounds of BOD, or the amount produced by about 686 persons.

"For an estuary which is as heavily used as Narragansett Bay, this amount of organic waste would appear insignificant, particularly in view of the fact that this water body is characterized by heavy tidal action having a flushing cycle of between 20 and 60 days," Dr. West stated.

The researcher also makes the point that the Type III MSDs may actually be aggravating a problem, not solving it. He explains that, prior to the law, boat sewage was dispersed and degraded very quickly. "The MSD regulation forces concentration of the effluent, which may or may not be adequately treated depending upon the quality of the treatment plant receiving the effluent," he states.

A final point Dr. West and his assistants make is that the costs imposed on boat owners have not appeared to produce any environmental improvements. Pump-out facilities for handling the effluent from Type III MSDs run about $10,000 and are a sizable investment for a marina owner; therefore, there are few facilities in existence. Full compliance by the estimated 5,111 boaters in Narragansett Bay during 1980 would require an investment of more than half a million dollars. Another $115,000 would be added per year for operation of the devices.

Aside from impacts on water quality and the pocketbook, Dr. West points out that the controversy over the MSD regulations, and the belief that these regulations would be rescinded, has produced widespread disregard of the law. Rhode Island "may furnish an example of what happens when a piece of legislation is written without assessing the socio environmental impacts," he says.

The researchers do offer a solution to the problem. This is to restrict effluent discharges only in ecologically sensitive areas and to concentrate on the enforcement of this regulation. The result would be protection of the areas that need it and a reduction of the regulatory burden imposed on the U.S. Coast Guard, which has to implement this law, they point out.

NMFS-MAS JOIN IN FISHERIES GEAR RESEARCH

A demonstration showing that two fishing vessels of dissimilar sizes can jointly pull a trawl in the fuel-efficient pair trawling method got underway in February.

The demonstration involves the National Marine Fisheries Service fisheries engineering group, which recently moved to the URI Narragansett Bay Campus, and the URI Sea Grant Marine Advisory Service. The vessels being used in the project are the NMFS steel stern trawler, the 65-foot *Gloria Michelle*, which is berthed at Davisville, and the 47-foot *Gail Ann*, operated by the URI Department of Fisheries and Marine Technology.

Crucial to the pair trawling demonstration is an instrument called a warp tension meter. This allows a skipper to monitor the amount of pull on his vessel's trawl lines and thus ensure that he and his partner are pulling the net straight through the water.

After the tests aboard the two vessels are completed this spring, the meters will be available on loan to owners of commercial fishing vessels who might want to try pair trawling.

The pair trawling project is one of the first joint projects that the NMFS group and MAS have undertaken. A larger cooperative program in gear research and development is being planned for the two units.

This includes testing of a model of the NMFS bottom survey trawl in the tow tank facility operated by the URI Department of Ocean Engineering; evaluation of a large mesh bottom trawl; vessel stability and safety tests; on-board fish handling

**Advisory
Council On
Historic
Preservation**

**1522 K Street, NW
Washington, DC 20005**

AUG 1 1 1983

Mr. E. T. Heinen
Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street NE.
Atlanta, GA 30365

Dear Mr. Heinen:

We have received and reviewed the draft environmental impact statement for North Carolina Barrier Island Wastewater Management. It appears that the proposed strategy emphasizing development of on-site and small community wastewater management systems would probably result in the fewest overall impacts to historic and archeological properties and provide considerable flexibility in future development. We understand that further site-specific data on wastewater management system effects on historic and archeological properties will not be available until sometime during future community-specific planning or in Step 2 Design grants. Since this development would be permitted through the North Carolina Coastal Management Program we have no further comments at this time. EPA and the local communities should continue to cooperate and consult with the North Carolina Coastal Management Program, and the North Carolina State Historic Preservation Officer on the need for field or other investigations to identify and evaluate specifically-affected historic and archeological properties, as well as to assess any system construction effects on them. As EPA considers any construction grants for Steps 2 or 3 that could affect properties listed in or eligible for the National Register, EPA should request the specific comments of the Council at that time in accordance with Section 106 of the National Historic Preservation Act and 36 CFR Part 800. 6

Thank you for providing the opportunity to comment. If you have questions or wish future assistance, please contact Ronald D. Anzalone at 202-254-3974 (an FTS number).

Sincerely,

Don L. Klima
Chief, Eastern Division
of Project Review

North Carolina State University
School of Agriculture and Life Sciences
Academic Affairs, Extension & Research

Department of Soil Science
Post Office Box 5907
Raleigh, NC 27650
(919) 737-2655

August 23, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

Attached are written comments for the review of the draft environmental impact statement EPA 904/9-83-108a, entitled "North Carolina barrier island wastewater management".

Sincerely yours,

Craig Cogger
Craig Cogger
Associate Researcher

CC/dlp

Enclosure

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AUG 29 1983
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ATLANTA, GA.

North Carolina State University at Raleigh is a co[illegible] institution of The University of North Carolina.

ENVIRONMENTAL IMPACT STATEMENT

North Carolina Barrier Island Wastewater Management
Written Comments

Craig Cogger, Ph.D.
Research Associate, On-Site Waste Management
Soil Science Department
North Carolina State University
Raleigh, NC
August 23, 1983

General Comments

Overall, this environmental impact statement (EIS) is thorough, informative, and well done. The recommended EIS strategy using on-site systems with small community systems in sensitive or higher-density areas appears to be the best overall for most of our barrier islands.

Several of the assumptions and conclusions should be reexamined, however, to make this EIS a better assesment of the monetary, health, and environmental costs of waste treatment on the barrier islands.

Specific Comments

Several specific comments are described below. Most pertain to material which appears a number of times in the document, so specific page references are not given.

1. Separation to Water Table

NC rules require a minimum one-foot vertical separation between the bottom of the absorption area and the seasonally high water table (SHWT). As little as one foot from the surface to the SHWT can be used with a mound system. Data we have collected from experiments on West Onslow Beach suggest that a one-foot separation is not adequate for effluent treatment under barrier island conditions (See Table 1 in Appendix).

I suggest that the EIS recommend a more conservative two-foot separation. The EIS already points out that much developable land meets this requirement, and that alternative systems are available which can be used to increase the separation to the SHWT. A two-foot separation requirement should not have a large effect on development. 7

2. Cost

a. System installation. For low-pressure pipe (LPP) and mound systems, absorption areas are more expensive and pumping systems less expensive than listed in the EIS. Also, in areas where these systems are not widely used costs will be much higher, because of a lack of competition and expertise among installers. 8

The EIS cost figures appear to assume free designs done by the health departments. There is no guarantee that this will be the case, so design costs by consultants may also need to be included. 8

b. Maintenance. The EIS allows only $20/year for pumps and controls. For the $700 pump system they envision, this assumes a replacement interval of 35 years (disreagarding interest and inflation). Even for a $300 system, the replacment period would be 15 years, which is probably too long. 9

c. Management. In areas where there are substantial numbers of LPP and mound systems, management to assure proper maintenance and monitoring will be necessary for long-term proper operation of the systems. Yet, I do not see where costs for this management are listed. 10

d. Other costs. In addition to management, the EIS lists other priorities such as gound water monitoring. But, where are the costs for these? 11

e. Water supply. The EIS assumes that ground water may be polluted in some areas as density of development increases. Should the cost of hook-ups to deep well or off-island systems for shallow well users in pollution-prone areas be included in the overall EIS costs? 12

3. Density of Development

a. Effect of on-site systems on density. The EIS states that lower density development will occur with on-site systems compared to regional systems. It is true that on-site systems will not allow densities such as those at Myrtle Beach, but very high densities are still allowed by current state rules. Market forces still play an important role in obtaining high density development.

I believe that the current defacto density requirements may allow serious pollution of the shallow aquifer, and that more conservative density requirements should be recommended. One approach would be to designate areas for high or low density development. In this way the degradation of the shallow aquifer would only be limited to high-density areas. 13

b. Ground water quality. The EIS questions the concern about the pollution of the shallow ground water aquifer. But, there is still some use of the shallow aquifer for drinking water and the cost of losing this aquifer should be considered in the economic analysis.

Also, the NC Division of Environmental Management has proposed rules which would set standards for ground water quality. If they are accepted in a form similar to the proposed one, and if an enforcement mechanism is established, these proposed rules will reduce the allowable density of development with on-site systems. 14

c. EIS vs. 201 plan. The EIS states that the effluent loading rate for off-site spray irrigation (SI) system would be higher than for on-site subsurface systems. For soils typical of barrier islands, this is incorrect. 15

There is currently no requirement to consider the loading rate of nitrogen or any other constituent except water when designing subsurface systems. All constituents must be considered when designing a SI system, however. For domestic-type effluent on a sandy soil, a large subsurface system (such as that for a condominium complex) can be loaded at several times the rate used for a SI system, because of this difference in design criteria. 15

4. Pollution Potential of On-site Systems

The EIS states that few cases of pollution by on-site systems on the barrier islands have been documented. It notes problems with a "few isolated finger canal areas". But, the report does not state how many finger canal areas were given a clean bill of health, or how extensively the movement of effluent into the shallow aquifer and surface waters has been studied. It is likely that the few isolated cases are due to few isolated studies, and the potential problems are more wide spread.

As mentioned earlier, we have seen rapid movement of pollutants into the ground water when the separation to the water table is inadequate, and rapid movement of nitrate when the water table separation is adequate (Appendix Table 1). We have also sampled one developed and one undeveloped finger canal area at Atlantic Beach, and found substantial differences in time-averaged ammonium and fecal coliform levels in the ground water between the two. 16

There just hasn't been enough data collected to conclude that potential pollution problems are few and isolated.

5. Conclusions

As stated in the general comments, this EIS is basically well done. Although I agree with its general conclusions, I feel that it falls short in assessing the costs of the maintenance and management of the on-site strategy, and in evaluating the pollution potential of on-site systems. If management and maintenance are not carried out, pollution of the shallow ground water and surface waters will become an ever-increasing problem, as development of these areas continues.

APPENDIX

Table 1. Movement of pollutants into the ground water beneath experimental septic absorption trenches in a Corolla soil. May, 1982 - May, 1983

Loading Rate	NH_4^+-N	NO_3^--N	P	Fecal Coliforms	Bovine Enterovirus
	- - - - - mg/L	- - - - -		MPN/100 ml	PFU/L
	2-foot separation				
Conservative	<0.5	1.9	0.1	<2	<1
Normal	0.6	4.2	0.1	7	<1
Overloaded	0.8	14.6	1.9	25	<1
	1-foot separation				
Conservative	6.1	0.9	1.5	700	2,000
Normal	9.2	1.0	2.8	3,000	3,000
Overloaded	14.0	2.0	3.9	10,000	4,000
	Septic-tank effluent				
	29	<0.5	5.6	300,000	50,000

NORTH CAROLINA DEPARTMENT OF CULTURAL RESOURCES

Raleigh,
North Carolina
27611

Division of
Archives and History
William S. Price, Jr. Director

Sara W. Hodgkins,
Secretary
James B. Hunt, Jr.,
Governor

August 25, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: North Carolina Barrier Island Wastewater
Management, DEIS, Multi-county, Coastal,
CH 84-E-0000-5040

Dear Mr. Heinen:

We have received notification from the State Clearinghouse concerning the above Draft Environmental Impact Statement.

We are unable to comment on the potential effect of this project on cultural (archaeological, architectural, and historic) resources until we receive further information. Within the DEIS reference is made to an Atlas which identifies the locations of ". . . known sites of historical and archaeological importance . . ." (pages III-27, 2-120, 3-132). Please forward a copy of the Atlas so we may complete our review. 17

The above comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966, the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800, and to Executive Order 11593, "Protection and Enhancement of the Cultural Environment."

Thank you for your cooperation and consideration. If you have questions concerning the above comments, please contact Ms. Renee Gledhill-Earley, Environmental Review Coordinator, at 919/733-4763.

Sincerely,

John J Little

John J. Little, Deputy State
Historic Preservation Officer

JJL:slw

cc: Clearinghouse

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NORTH CAROLINA
SALTWATER FISHING FEDERATION

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

August 25, 1983

Dear Mr. Heinen:

In reviewing the summary of the Draft Environmental Impact Statement, North Carolina Barrier Islands Wastewater Management, signed by Charles R. Jeeter, Regional Administrator on May 24, 1983; the North Carolina Salt Water Fishing Federation supports the EIS for the following reasons.

The NCSWFF is dedicated to the management and enhancement of the recreational salt water fishery along the North Carolina coast, it's sounds and estuaries. The 201 plan which proposes large scale, regional wastewater treatment systems, not only being costly as pointed out in the EIS, would promote high density development on the barrier islands. The increased number of dwellings, condominiums, and businesses would increase surface runoff and untreated effluent from parking lots, roads, and new construction sites.

As pointed out further in the EIS, and supported by surface runoff studies in Florida, this runoff could have more unsatisfactory influence on the water quality of the estuaries and on-shore waters than the treated wastewater. The NCSWFF is in favor of the small package treatment plant concept, where practical, or retaining individual treatment systems, i.e. septic tanks, where that is the more logical approach. 18

I would hope the final EIS will place additional emphasis on the practicallity of package treatment plant concept economically, as well as being the best alternative for assuring improved water quality. The success or failure of reproduction of many recreational and commercial fin fish and shell fish depends upon suitale water quality in the estuaries and near-coastal waters.

Sincerely,

Robert G. Stryker

Robert G. Stryker
President

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ATLANTA, GA.

1106 MANCHESTER DRIVE, CARY, N.C. 27511

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta GA 30333
(404) 452-4257

August 26, 1983

E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

We have reviewed the Draft Environmental Impact Statement (EIS) for North Carolina Barrier Island Wastewater Management. We are responding on behalf of the Public Health Service.

We have reviewed this document for possible health effects and find that potential problems are identified. However, we believe that mitigation of these problems is not adequately assured. Mitigation measures are stated as being "the responsibility of the local planning agency." It appears that the communities would have the option of passing and/or revising codes, ordinances, and other regulatory measures only if they so desired. As stated on page IV-5, "The NFA and EIS Strategies would lead to lower density developments and less concentrated urban runoff would be anticipated. If the citizens of the area desire a management agency, this agency could serve to promote these best management practices." 19

While the responsibility for adoption of these measures may be that of an existing local agency or the responsibility of some additional agency that should be established, the mitigation measures identified to prevent potential problems that would result from this action must be ensured. Implementation of these mitigation measures should be made a condition for making the EPA grant monies available for these projects.

Thank you for the opportunity to review this Draft EIS. Please send us a copy of the final document when it becomes available. If you have any questions about our comments, please contact Mr. Lee Tate at 452-4161.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

ENVIRONMENTAL ASSESSMENT BRANCH
AUG 29 1983

TOWN OF KILL DEVIL HILLS
P.O. BOX 719
KILL DEVIL HILLS, N.C. 27948
(919) 441-7236

August 29, 1983

BEN F. HILL, III
Mayor

COMMISSIONERS

LURANA J. COWAN
DAVID MENAKER
JAMES F. MURPHY
LAURA PAXHIA
RICHARD BAER

LLOYD BALLANCE
Manager

CLAIRE M. WATERFIELD
Finance Officer/Clerk

SHARON L. CONSOLVO
Tax Collector

JOHN G. GAW, JR
Attorney

RAYMOND P. STURZA, II
Planner

DARRELL MERRELL
Superintendent of Water Services

MIKE LUHOUSE
Superintendent of Public Works

W. C. (BILLY) GRAY
Building Inspector

W. E. GARD
Fire Chief

C. E. BRAY, III
Chief of Police

MEMORANDUM:

TO: Mr. E.T. Heinen, Chief
Environmental Assessment Branch
U.S. Environmental Protection Agency
345 Courtland St., N.E.
Atlanta, Georgia 30365

FROM: Ray Sturza
Town Planner
Town of Kill Devil Hills
P.O. Box 719
Kill Devil Hills, NC 27948

RE: Comments on N.C. Barrier Islands Wastewater Management Draft Envrionmental Impact Statement

Please find enclosed my comments on the above referenced document, as presented pursuant to OMB Circular A-95 at the August 18, 1983 meeting of the Albemarle Commission, LRO for Northeastern North Carolina. Thank you for the opportunity to comment.

cc: Lloyd Ballance, Town Manager

Enclosure

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TOWN OF KILL DEVIL HILLS
P.O. BOX 719
KILL DEVIL HILLS, N.C. 27948
(919) 441-7236

BEN F. HILL, III
Mayor

COMMISSIONERS
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DAVID MENAKER
JAMES F. MURPHY
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RICHARD BAER

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Town Manager

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Finance Officer/Clerk

SHARON L. CONSOLVO
Tax Collector

JOHN G. GAW, JR.
Town Attorney

RAYMOND P. STURZA, II
Town Planner

DARRELL MERRELL
Superintendent of Water Services

MIKE LUHOUSE
Superintendent of Public Works

W. C. (BILLY) GRAY
Building Inspector

August 10, 1983

MEMORANDUM

TO: Ruth Leggett, Albemarle COmmission

FROM: Ray Sturza, Kill Devil Hills Town Planner RS

RE: EPA N.C. Barrier Island Wastewater Management EIS

In reference to the clearinghouse review of the EPA's draft EIS concerning the N.C. Barrier Islands, I offer the following comments:

1.) The EIS reaches conclusions that conflict with the Kill Devil Hills Land Use Plan (pg.9), which favors the immediate construction of a regional wastewater treatment facility. This policy was adopted because:

a.) Many of the lots already platted in Kill Devil Hills are too small for ground absorbtion systems.

b.) Many of the soils in Kill Devil Hills are unsuitable for ground absorbtion systems.

c.) At the time the policy was adopted, there was a concern that septic tank infiltration was having deleterious affect on estuarine waters.

While the draft EIS addresses item (c) above, it seems to neglect the considerations associated with (a) and (b) above. 20

2.) The Kill Devil Hills Land Use Plan does, however, indicate that the Town will investigate the feasibility of package plants. The EIS fails to take into consideration the following when examining the package plant alternative:

a.) Package plant standards for construction and management are insufficient to insure quality construction and operation of the plant and its lines. 21

b.) Staff is currently unavailable for sufficient monitoring of maintainence on equipment and effluent discharge. 22

c.) Parties dependent on a package plant that fails, is over capacity, or is unable to meet health and safety regulations are in effect "locked in" on the dysfunctional plant and such plants are rarely shut down due 23 to the degree of hardship such action would create. As such, plants in violation often continue in violation, many times for years, until a solution is reached. 23

3.) If information has been generated that documents effectively and with reliable data that non-point surface runoff is the primary source of the continued degredation of the estuarine waters of Coastal North Carolina, I recommend that information be forwarded to the N.C. Department of Natural Resources and Community Development, Division of Environmental Management and that a moratorium be placed on any further authorization of new drainage projects pending the development of satisfactory management plans to mitigate the adverse inpact of massive drainage on the estuarine waters of Coastal North Carolina. 24

cc: Lloyd Ballance, Town Manager

RS/bb

THE RALEIGH SALT WATER SPORTFISHING CLUB

4818 North Hills Drive
Raleigh, N.C. 27612
(919) 787-2836

August 29, 1983

E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

This is in response to public notice requesting comments concerning the draft Environmental Impact Statement for future wastewater treatment on the North Carolina barrier islands. We support the EIS Strategy that recommends barrier island communities consider on-site and community wastewater treatment systems in lieu of the regional systems recommended by draft 201 Facilities Plans.

We feel regional plants with ocean outfalls or land application discharge of treated wastewater will promote higher density development on the barrier islands, leading to a decline in both ocean and estuarine water quality, due to an increase in wastewater loading and surface runoff. A decline in water quality would certainly have a damaging affect on the future of sportfishing on the North Carolina barrier islands. 25

Sincerely,

Raleigh Salt Water Sportfishing Club

Robert N. Vinay

Robert N. Vinay
Barrier Island Wastewater Committee Chairman

RNV:lj

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TOWN OF OCEAN ISLE BEACH
ROUTE 2, BOX 0-8
OCEAN ISLE BEACH, N. C. 28459

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ATLANTA, GA.

August 29, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
U. S. Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Ga 30365

Re: Comments on the North Carolina Barrier Islands Wastewater Management Draft Environmental Impact Statement

Dear Mr. Heinen:

Regretfully, we were unable to attend the public hearing held recently in Brunswick County.

Having been Mayor of the Town of Ocean Isle Beach for over ten years, and having faced the reality of the great need this community has for a centralized municipal wastewater treatment system, the futile delays which have been caused by the Environmental Protection Agency's exercises in bureacracy have been most unhealthy for our town.

26

Since 1973 the Town of Ocean Isle Beach has been attempting to face the facts that septic tank systems are inadequate means of waste disposal for the varied types of development a progressive coastal town experiences. The people of Ocean Isle Beach feel they have been and continue to be victims of unrealistic suppositions by a network of job-making bureacrats.

We invite you to expend some of your extensive Environmental Impact Statement planning budget to come live among us and witness the reality with which we are trying to responsibly deal.

To our knowledge Congress has not legislated to instruct the Environmental Protection Agency to cause development to stop on barrier islands. We ask that you be honest about your intentions and consider data based on the mandates Congress has officially given your agency. 27

Enclosed is a copy of Comments on the North Carolina Barrier Islands Wastewater Management Draft Environmental Impact Statement by Paul S. Dennison of Henry von Oesen and Associates. We totally agree with his excellent analysis of this pitiful situation.

We realize this letter is frank; we are most frustrated and only want what is best for our people--we want to be treated with fairness and honesty.

With best regards, I am

Sincerely,

TOWN OF OCEAN ISLE BEACH

LaDane W. Bullington

LaDane W. Bullington
Mayor

LWB/at
Enclosure
cc: Congressman Charlie Rose
Senator Jesse Helms
Senator John East

HENRY VON OESEN AND ASSOCIATES
CONSULTING ENGINEERS
AND PLANNERS
Telephone (919) 763-0141
611 PRINCESS STREET P.O. DRAWER 2087 WILMINGTON, NORTH CAROLINA 28402

COMMENTS ON THE
NORTH CAROLINA BARRIER ISLANDS WASTEWATER MANAGEMENT
DRAFT ENVIRONMENTAL IMPACT STATEMENT

I am Paul S. Denison of Henry von Oesen and Associates, Consulting Engineers & Planners of Wilmington, North Carolina. We represent not only our own views based on many years of engineering planning and design experience on the entire southeastern seaboard, but also the interests of the numerous communities we serve in the coastal area. Thus, we appreciate this opportunity to comment on the North Carolina Barrier Islands Wastewater Management Draft Environmental Impact Statement.

We feel that this EPA EIS exercise has imposed an unconscionable three-year delay in resolving the wastewater treatment and disposal problems on the North Carolina barrier islands. During this delay period, the costs for all alternative solutions to the problem have escalated considerably. The total amount of federal funds allocated to the State of North Carolina for corrective actions have been diminished by attritional use and budgetary cuts. The state's Clean Water Bond Act grant fund which is used for matching federal grants has been depleted. As a primary result of the moritorium on actions imposed by the EIS, all barrier island projects on the North Carolina Construction Grants Funding List have slipped in priority so that funds for facilities design and construction will not now be available until fiscal year 1986 or after. By that time, federal participation will be limited by law to 55% of the eligible project costs, rather than the 75% at present. 28

In view of these developments it is impossible to accept the fact that the "EIS Strategy" calls for further revisions to the 201 Facility Plans which will result in further bureaucratic delays in resolving the problems that exist. Several local units of government, completely frustrated by these events, have wisely elected to abandon the 201 Facilities Planning process entirely and to pursue other viable solutions independent of the EPA Construction Grants process. This may be an EPA objective, but it wasn't Congress' intent when they passed Public Law 92-500. 29

In summary (and as an over simplification), the EIS recommends the continued use of septic tanks and so-called "community systems" as the least-cost solution to existing wastewater disposal problems. This position is inconsistent with recent scientific research and even prior EPA studies which show that septic tanks do cause pollution of surface and ground waters (see references attached). 30

We feel that the inadequately supported and less than scientific
position taken by the authors of the EIS will only exacerbate 30
existing problems - not solve them.

Many of the Barrier Island 201 Facility Plans which preceded
the EIS showed that central sewer systems could be designed and 31
constructed with federal and state grant assistance for user fees
in the range of $12 to $18 per household. In all proposals we
are familiar with, wastewater contaminants were effectively removed
from the barrier islands, their related groundwater systems, and
their adjacent fragile estuarine waters. We get the impression
that EPA simply did not want to fund any of these solutions
recommended in the 201 Plans based on the fear that solving the 32
sewage disposal problems would "stimulate growth" on the barrier
islands. However, despite the delays and lack of aggressive
action to resolve wastewater disposal problems, significant
growth has occurred on all of the barrier islands. This in spite
of EPA's defacto withdrawal of federal funds over the past three
years.

Now the federal funding picture has altered to a state of unfavorable economics, but the development and increasing pollution potential goes on. More septic tanks and so-called community systems are simply not the answer. We need to get on with the business of truly resolving the problem - not re-studying it. Enough time and money have been wasted already. We are confident that time will continue to demonstrate that this EPA Barrier Island EIS expenditure of time and money has been another futile bureaucratic exercise that produces no solutions to a serious and growing problem.

Thank you for this opportunity to present our views in this matter.

Paul S. Denison, P. E.
Vice President

William E. Burnett, Env. Planner

REFERENCES

Carlile, B. L., Etal (October 1981) "Movement and Fate of Septic Tank Effluent in Soils of the North Carolina Coastal Plain". N. C. State University, Raleigh, N. C.

Carriere, G. D. and Canter, L. W. (October 1980) "Effects of Septic Tank Systems on Ground Water Quality". Report No. NCGWR 80-8, National Center for Ground Water Research, Norman, Oklahoma.

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NCDEM (April 1978) "The Influence of the Water Table Aquifer on Shellfish Waters Near Surf City and Old Settler's Beach, Pender and Onslow Counties, N. C." Raleigh, N. C.

USEPA (1975) "Waste Source and Water Quality Studies, Surf City, N. C. and Vicinity". Athens, Ga.

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Wilmington Morning Star / Wednesday, August 24, 1983

Stock prices sink, 4B

EPA's approach to coastal development criticized

By Kim McGuire
Staff Writer

A Brunswick County official and a local engineer blasted the U.S. Environmental Protection Agency Tuesday night, saying the agency is trying to halt development and encourage the proliferation of septic tanks on the state's barrier islands.

The two speakers made statements at a public hearing on the EPA's draft environmental impact statement on the management of wastewater on North Carolina's barrier islands.

The EPA document calls for further revision of 201 plans, which have proposed construction of wastewater collection, transportation and treatment facilities with the help of federal funds. The EPA recommended that future plans for wastewater treatment encourage septic tanks and small-scale community systems, rather than the more costly regional projects proposed originally.

John Harvey, assistant county manager for Brunswick County, said the EPA document is "full of false assumptions" about pollution from septic tanks and projected growth on the coast.

"We are apprehensive that more consideration has been given to nature than to man," Harvey concluded.

Paul S. Denison, of the Wilmington engineering firm Henry von Oesen and Associates, charged that the EPA has spent three years delaying a decision on wastewater treatment policies. During that time, he said, costs have increased dramatically and projects planned for the barrier islands have slipped on the priority list for public funding. The von Oesen has developed 201 plans for numerous communities on the barrier islands.

"Several local units of government, completely frustrated by these events, have wisely elected to abandon the 201 facilities planning process entirely to pursue other viable solutions," Denison said. "This may be an EPA objective, but it wasn't Congress' intent . . .

"We get the impression that EPA simply did not want to fund any of these solutions recommended in the 201 plans based on the fear that solving the sewage disposal problems would stimulate growth on the barrier islands," he said.

Denison asked the EPA officials leading the hearing how much money has been spent on developing the environmental impact statement over the past three years.

A response of $545,000 spurred shaking heads in the crowd of about a dozen citizens. Bowman Crum, EPA project manager, said the expense is justified, however, because it produced valuable information on natural resources and ground water.

The EPA officials will hold hearings at Bogue Banks tonight and at Roanoke Island Thursday. They expect a final decision on policies for wastewater management on North Carolina's barrier islands to be made before the end of 1983.

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT. CORPS OF ENGINEERS
P. O. BOX 1890
WILMINGTON. NORTH CAROLINA 28402

IN REPLY REFER TO August 31, 1983

Environmental Resources Branch

Mr. E. T. Heinen
Chief, Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N. E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

We have reviewed the draft Environmental Impact Statement for North Carolina Barrier Islands Waste Water Management and find it to be well prepared. The report represents much needed and timely guidance for the planning of wastewater management facilities in coastal areas. Our only comment of note is that the individual strategies do not include flood plain management impacts or considerations of EO 11988. 33

Thank you for the opportunity to review and comment. We will follow the progress of this report with great interest.

Sincerely,

Wayne A. Hanson

Wayne A. Hanson
Colonel, Corps of Engineers
District Engineer

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DAEN CWP-P/Hand

[illegible] 1983
[illegible]
EPA-REGION IV
ATLANTA, GA.

NATIONAL WILDLIFE FEDERATION
1412 Sixteenth Street, N.W., Washington, D.C. 20036 202—797-6800

August 31, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
U.S. Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

The National Wildlife Federation (NWF) submits the following comments on the draft Environmental Impact Statement (EIS) concerning North Carolina's Barrier Island Wastewater Management. The Federation supports the No Federal Action (NFA) alternative.

The National Wildlife Federation is the nation's largest conservation organization, with affiliates in 51 states and territories. Our four million members and supporters are dedicated to the wise use and conservation of our nation's natural resources, including barrier islands and beaches. As an ardent supporter of the Coastal Barrier Resources Act (CBRA), the Federation has a strong interest in federal policies affecting coastal barrier management.

While on a theoretical basis the EIS strategy (the preferred alternative) recommended by the Environmental Protection Agency (EPA) is an improvement over adopting the present, environmentally unsound, 201 plans for wastewater management on North Carolina's barrier islands, the practical result of implementing the EIS strategy will differ little. 34

The EIS strategy calls for more and better planning of wastewater management facilities by revising draft 201 plans, which currently recommend large centralized collection facilities, using procedures and criteria developed by the EIS. The desired result of these revisions is to encourage a full consideration of alternative wastewater management techniques. There is, however, no guarantee that alternatives will be adopted, nor can there be any protection from the natural tendency to overestimate the future need for wastewater treatment capacity. 35

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In large part, this tendency is caused by the availability of federal financial assistance. With the knowledge that the federal government is willing to pay for a large portion of the construction costs, small communities are encouraged to overbuild treatment capability to cover future needs, whether anticipated or not.

The EIS procedures may dampen this tendency, but there will still be pressure and a natural inclination to inflate population assumptions and alter land-use designations to favor the construction of larger, centralized collection facilities. Once built, the excess capacity of these facilities will promote greater, if not excessive, development densities with resultant environmental harm.

Therefore, the National Wildlife Federation urges EPA to adopt the No Federal Action alternative. The elimination of federal financial assistance will encourage community planners to appraise future wastewater treatment needs more realistically and to adopt more reasonable patterns and levels of growth. 36

The people living on North Carolina's barrier islands should be internalizing the costs of living there. It is more expensive to build and maintain facilities on shifting, storm-prone barrier islands. Those people who benefit most from the construction of wastewater management facilities should shoulder the burden of paying for them--not the federal taxpayer. This was a central concept recognized by Congress and signed into law by the President with the enactment of the Coastal Barrier Resources Act (CBRA).

Also, since the No Federal Action alternative will likely lower development densities more than the EIS strategy, the NFA alternative more effectively addresses the problem of non-point pollution. Non-point pollution was identified in the EIS as a principal water quality problem in North Carolina, usually associated with higher density developments. 37

In the executive summary of the draft EIS (page vi), EPA notes that the adoption of the No Federal Action alternative could result in some environmental degradation from improper operation or maintenance of local treatment systems. While it is possible, in the absence of federal involvement, that some communities may neglect their responsibility for adequately managing wastewater pollution, the Federation believes that other mechanisms are available to deal with this problem if it arises, without the necessity of federal financial involvement. 38

The National Wildlife Federation appreciates this opportunity to comment.

Sincerely,

Bruce Leighty

Bruce Leighty, Coordinator
Barrier Islands Project

United States
Department of
Agriculture

Soil
Conservation
Service

P.O. Box 27307
Raleigh, NC 27611

August 31, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Heinen:

We have reviewed the North Carolina Barrier Islands Wastewater Management Draft Environmental Impact Statement (DEIS).

It appears that the EIS Strategy will offer waste management planning definite cost-effective and environmentally sound alternatives. We are pleased that soil survey information is included in the strategy as a tool for evaluating and revising existing 201 plans. Although not site specific, the soil survey information can be valuable in community and area planning. Detailed soil investigation are necessary for all on site and community site systems as well as for many of the treatment facilities. 39

We appreciate the opportunity to review this DEIS and offer our assistance, consistent with conservation district work priorities to the local region wastewater management units in the technical phases of their erosion and sediment control.

Sincerely,

George C. Norris
Acting
Coy A. Garrett
State Conservationist

cc:
Director, Office of Federal Activities
Peter Myers, Chief, SCS
Billy M. Johnson, Director, SNTC
Dr. Maurice Cook, Director, SWCD
Sam Cox, AC, SCS
David Combs, AC, SCS

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The Soil Conservation Service
is an agency of the
Department of Agriculture

North Carolina
Department of Administration
116 West Jones Street Raleigh 27611

James B. Hunt, Jr., Governor
Jane Smith Patterson, Secretary

Margaret C. Riddle
Coordinator
Office of Policy and Planning
(919) 733-4131

August 31, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Dear Mr. Heinen:

RE: North Carolina Barrier Island Wastewater Management
DEIS, Multi-County - SCH File #84-E-0000-5040

The State Clearinghouse has received and reviewed the above referenced project. As a result of this review, the State Clearinghouse has received the attached comments from the North Carolina Department of Natural Resources and Community Development and the Department of Cultural Resources.

Thank you for the opportunity to review the above referenced document.

Sincerely,

Chrys Baggett

Chrys Baggett (Mrs.)
Clearinghouse Director

CB/jcp

Attachments

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NORTH
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OF
CULTURAL
RESOURCES

Raleigh,
North Carolina
27611

C
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P
Y

Sara W. Hodgkins,
Secretary
James B. Hunt, Jr.,
Governor

August 25, 1983

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: North Carolina Barrier Island Wastewater
Management, DEIS, Multi-county, Coastal,
CH 84-E-0000-5040

Dear Mr. Heinen:

We have received notification from the State Clearinghouse concerning the above Draft Environmental Impact Statement.

We are unable to comment on the potential effect of this project on cultural (archaeological, architectural, and historic) resources until we receive further information. Within the DEIS reference is made to an Atlas which identifies the locations of ". . . known sites of historical and archaeological importance . . ." (pages III-27, 2-120, 3-132). Please forward a copy of the Atlas so we may complete our review. 40

The above comments are made pursuant to Section 106 of the National Historic Preservation Act of 1966, the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106, codified at 36 CFR Part 800, and to Executive Order 11593, "Protection and Enhancement of the Cultural Environment."

Thank you for your cooperation and consideration. If you have questions concerning the above comments, please contact Ms. Renee Gledhill-Earley, Environmental Review Coordinator, at 919/733-4763.

Sincerely,

John J. Little, Deputy State
Historic Preservation Officer

JJL:slw

cc: Clearinghouse

North Carolina Department of Natural Resources & Community Development
James B. Hunt, Jr., Governor
Joseph W. Grimsley, Secretary

MEMORANDUM

TO: Chrys Baggett
State Clearinghouse

FROM: Anne Taylor Anne

SUBJECT: 84-5004 N.C. Barrier Island Wastewater Management

DATE: August 30, 1983

The Department of Natural Resources and Community Development has completed its review of the N.C. Barrier Islands Wastewater Management Draft Environmental Impact Statement.

Considerable time has evolved since this projects' beginning and there is a strong need in addressing all comments and finalizing the EIS process at the earliest possible date. As this process proceeds, we feel that significant questions need to be addressed concerning availability of funds, the ability to manage these systems and the responsiveness of EPA in reviewing and approving the alternative and innovative systems. These questions are highly important and the timeliness of this resolution cannot be overemphasized.

To assist in continued development of this project, specific comments from the Office of Coastal Management and the Division of Environmental Management have been attached for your consideration.

Thank you for the opportunity to review. If questions arise or we can be of further assistance, please notify me at 919-733-4984.

P. O. Box 27687 Raleigh, N.C. 27611-7687
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COMMENTS

1. The final EIS should discuss in detail the modifications that were made in the 1982 Municipal Wastewater Treatment Construction Grant Amendments in relationship to the feasibility of local communities to receive funds to update and implement 201 facility plans. That is, three specific areas of concern should be examined more thoroughly: 1) a reduction in the federal share, 2) a change in the method of federal participation of funding plans and design work, and 3) a change in policy whereby reserve capacity shall be restricted to existing flows. 41

2. Since it is EPA's policy that administrative action be taken to reduce the inventory of 201 facility plans and some of the local communities will be impacted by this policy, it appears the "No Federal Action Strategy" is the most realistic strategy for several communities covered by the EIS. Should the EIS give more attention to the reality of fewer federal and state dollars to implement anything for some communities? 42

3. The model on hydrodynamic response to on-site disposal of wastewater should be tested on one or two barrier island communities to indicate its validity and reliability for projecting the overall impact on groundwater. 43

4. The EIS has been delayed significantly beyond EPA's projected target dates for completion. Therefore, every step should be made to finalize this process expeditiously. 44

MEMORANDUM

TO: MELBA STRICKLAND

FROM: DANIEL SMALL

SUBJECT: EPA'S GENERIC EIS, BARRIER ISLAND 201 FACILITY PLANS

DATE: AUGUST 23, 1983

(1) Chapter III, Section B,- b. (1), is devoted to an overview of the North Carolina Coastal Management Program and the various management tools available to assist in implementing the 201 strategies. This section does not, however, discuss the mechanism that would be used to implement the 201 strategies with the Coastal Program. We recommend that EPA coordinate more closely with the N. C. Office Coastal Management in this area to ensure that which ever 201 alternative is chosen can be meshed with our program. 45

(2) Chapter I, Section A.1.- states that draft 201 plans endeavored to justify the need for wastewater facilities on the barrier islands based on the pollution of shellfishing waters by failing septic tanks. It is then stated that (EPA?) analysis of the data does not support this position except in a very few cases involving development on finger-fill canals. It is further stated in the Executive Summary (Part B Background, under issues addressed) that non-point mainland surface runoff sources (not septic tanks) appeared to be the problem. We were not able to find the data used by EPA to draw this conclusion. If non-point mainland surface runoff is truely the cause, instead of failing septic tanks, it should be substantiated in the EIS document or associated appendices. 46

(3) The EIS presents a number of on-site and community wastewater treatment strategies that could substitute or be more reasonable than a centralized 201 facility. Our first question is have these treatment alternatives being discussed with Local Sanitation Specialists as to their practicality and feasibility within their areas? 47

United States Department of the Interior
OFFICE OF ENVIRONMENTAL PROJECT REVIEW
Southeast Region / Suite 1384
Richard B. Russell Federal Building
75 Spring Street, S.W. / Atlanta, Ga. 30303

SEP 2 1983

ER-83/879

Mr. E. T. Heinen, Chief
Environmental Assessment Branch
Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365

Dear Mr. Heinen:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) on North Carolina Barrier Island Wastewater Management and has the following comments.

General Comments

Fish and Wildlife Resources

Financial considerations of local governments were given a prominent role in the selection of the preferred alternative, while fish and wildlife resources were not adequately assessed in the impact sections. The DEIS does not include a cost-benefit analysis, or discussions on the costs of potential impacts to commercial and sport fisheries and other environmental impacts. 48

The DEIS should evaluate other alternatives such as:

1. A nonstructural alternative which would examine the control of density and/or development on barrier islands and consider the local coastal management land use plans.

   A nonstructural approach would reduce the scope of the impacts associated with wastewater management and, thereby, decrease the problems associated with management of wastewaters. Local zoning ordinances potentially would reduce impacts to fish and wildlife and other environmental resources. A monitoring program to assess environmental impacts of development could be used for directing and setting limits on future growth. 49

2. An alternative which evaluates tertiary treatment of 50
   wastewater. To avoid potential storm damage, floodproofing of 51
   wastewater facilities would be needed. The marine and 52
   estuarine environments adjacent to the barrier islands

support a varied and economically important commercial
fishery, sport fishery and associated tourism industry. Fish 52
and wildlife resources are part of a dynamic system and an
alternative that insures protection of these valuable
resources should be evaluated.

One of the basic premises of the DEIS is that nonpoint runoff sources,
not septic tanks, appear to be the problem regarding water quality.
During rain events septic systems may contribute to runoff and
adversely influence water quality. Based on information contained in
the DEIS, it would be premature to recommend a septic system when the
amount of nonpoint runoff pollution attributable to these systems has
not been assessed. The DEIS contains findings from several locales 53
that associate high bacterial counts with septic systems. Conversely,
some areas with sewered systems have the lowest bacterial counts.
Consequently, statements which imply that septic systems are not a
problem are misleading and should either be documented or revised in
the Final Environmental Impact Statement (FEIS).

The DEIS assumes that secondary adverse impacts to the natural
environment associated with the 201 strategy coupled with adverse
financial burdens to local governments are valid reasons for selecting
the preferred alternative. The environmental impacts associated with 54
continued use and construction of septic systems may be a more
immediate and profound potential environmental problem than the
development of centralized wastewater treatment facilities. The
secondary environmental impacts identified for the 201 strategy
include: higher levels of pollution from expected increased
population densities; impacts to sensitive natural areas; and, loss of
beachfront habitat. All of these impacts are also either associated 55
with septic systems or easily rectified by simple zoning regulations.
In fact, the 201 facilities are proposed to alleviate water pollution
from septic systems and improve shellfishing as described in the
DEIS's Alternatives Development Report (page 2-3). The development
costs associated with wastewater treatment should be weighed against
the total costs resulting from a reduction in environmental quality.
Although initial investments may be higher with a centralized system, 56
costs associated with long-term direct, indirect and cumulative
adverse impacts to fish and wildlife resources and other components of
the environment could dwarf these initial expenditures.

Adverse impacts to wetlands and fish and wildlife resources should be
in more detail. We recommend that a worst case analysis assessing
impacts to fish and wildlife resources by the various systems of
wastewater management should be completed and included in the FEIS. 57
The results should be used to reevaluate the existing alternatives and
to evaluate any additional alternatives prior to decisionmaking.

We believe that a cumulative impacts section is essential and should be included in the FEIS. This is especially important because of the areawide wastewater disposal issues for barrier islands throughout North Carolina. If the present alternatives will result in long-term adverse environmental impacts, then the identification and evaluation of more environmentally acceptable alternatives also is warranted. 58

Water Resources

In regard to septic tank/soil absorption treatment of wastewater, a confining layer at relatively shallow depths limits downward movement in infiltrating waters. Thus, the volume and effectiveness of permeable materials that can absorb contaminants and transmit effluents within the water-table aquifer are limited. In places, as little as 5 feet of sandy materials overlie the confining bed, which commonly consists of lagoonal mud deposits. Because of the limited volume and moderately high permeability of the sediments comprising the water-table aquifer, even if coliform concentrations are reduced, nitrates, phosphorous, and organic carbon travel laterally considerable distances to enter downgradient wells and surface waters significant for shellfish and recreation. We suggest that the analysis of environmental impacts should include consideration of the limitations imposed by the relatively thin water-table aquifer in many places on the barrier islands and by the comparatively small volume of permeable sediments in the water-table aquifer that is to receive the effluents. Partial mitigation might include test drilling at prospective sites to define the volume of absorptive materials available and evaluation of the efficiency of the sediments in removing pollutants. 59

In addition, the evaluation of the various alternatives and 201 plans should address potential effects on ground-water recharge and movement of the saltwater-freshwater interface that would result from the export of treatment effluent to the mainland or through offshore outfalls. 60

Specific Comments

Page II-1; third paragraph, last sentence: The document indicates that the North Carolina barrier islands are characterized by limited financial resources. Some areas do have significant development and should be recognized. Further, the commercial fishery, sport fishery, and other recreational opportunities significantly supplement the economy and this should be recognized in the FEIS. 61

Page II-14; second paragraph; second sentence: The need for continual repair and/or upgrading of septic tanks should be included in the analysis of the preferred alternative. 62

Page II-14 and II-15; Combination of Systems: Although a community may be served most cost-effectively in the short-term by a mixture of individual systems, the cumulative impacts to the environment and long-term costs should be evaluated. 63

Page II-18; first paragraph: A nonstructural alternative of limiting density and/or development should be included in the discussion. 64

Page II-39; Degree of Centralization: The centralized system should include safety features to alleviate much of the anticipated damage resulting from storms. 65

Page II-49; II-50 and II-51: It appears that the assumption is made that no significant environmental problems are anticipated from septic systems, or other potential systems, if the high water table is greater than 12 inches from the soil surface. This appears to be an unreasonable risk for groundwater contamination. The septic field will be inches away or adjacent to the groundwater table for at least part of the year. This could pose a significant adverse effect on groundwater resources, and we recommend the greater than 12 inch standard used to determine areas subject to development be increased substantially. 66 The areas identified as being suitable for development compose 62 percent of the surface of the barrier islands. If runoff, as identified by the DEIS, is the primary pollution problem, the development of this large a portion of the barrier island system will present a potentially significant environmental impact. 67

Page II-62; Affordability Analysis: A more accurate representation of existing conditions would result if the "second home" residents are included. 68

Page III-8; High Energy Beach Habitat: Fish occur in the faunal community and should be discussed. 69

Page III-8; Open Water Habitat: Amberjacks are not a commercially important species in North Carolina. 70

Page IV-2; second line: This statement asserting that waterfowl populations contribute to water pollution problems is undocumented. Further, it is contradictory to observations stated on page 6-22 of the Environmental Inventory Report. This discrepancy should be reconciled. 71

Page IV-4 and IV-5: We believe it is appropriate to consider and develop alternatives which would not have significant long-term environmental impacts. An alternative previously suggested would curb density and/or development thereby reducing the magnitude of impacts to the valuable commercial and sport fisheries resources. 72

Page IV-5; Other Resources; third paragraph: The statement that alterations to the terrain will not be significant should be qualified. Some terrain will be covered with impervious surfaces and dwellings and vegetation will be substantially modified. 73

Page IV-9; Mitigative Measures: The limiting of density and/or development based on evaluations of concurrent monitoring studies is a potential mitigative measure that should be included. Other mitigative measures could include: (1) floodproofing of central wastewater management facilities; and (2) development of tertiary treatment facilities at wastewater treatment sites to reduce environmental impacts, particularly if these measures are not included as alternatives. 74

Thank you for this opportunity to provide comments on this document. We would like to discuss our questions and concerns with you prior to the preparation of the FEIS.

Sincerely yours,

James H. Lee

James H. Lee
Regional Environmental Officer

OUTER BANKS CHAPTER
NATIONAL AUDUBON SOCIETY
S.R. BOX 321
KITTY HAWK, N.C. 27949

September 3, 1983

E.T.Heinen, Chief
E.P.A.
345 Courtland St., N.E.
Atlanta, Georgia
30365

Dear Mr. Heinen,

Speaking for the Outer Banks Audubon Chapter, We want to thank you for this opportunity to comment on this important issue.

We feel that barrier islands are fragile systems that are not suited for heavy, or high-density development. For this reason, we feel that the Federal Government should discontinue their policy of promoting development on Barrier Islands by supplying sewage systems, Federal flood insurance, etc.

Feeling this way, we are in favor of "the no Federal action strategy", with the state imposing tight regulations on present systems. We agree with you that private septic tank systems have their drawbacks, but to use taxpayers money to fund more central sewage systems on Barrier Islands, appears to promote growth in an area that is fragile and vulnerable and unable to support such growth. 75

Thank you again for the chance to respond to this important issue.

Sincerely,

Larry Bray

Larry Bray, Pres.
Outer Banks Audubon

ENVIRONMENTAL ASSESSMENT BRANCH
SEP 08 1983
EPA-REGION IV
ATLANTA, GA.

B. EPA Responses to Letters of Comment

W-1. Erosion and accretion are continuous processes along the barrier island chain. The redistribution of sediment which takes place within the sand sharing system is generally acknowledged. EPA agrees that these processes tend to be gradual except during storms when the effects can be significant in scope.

In recent decades, the North Carolina coast has been struck by fewer storms than the historic average. These numbers can expect to balance out over time, and severe damage to public infrastructure and private property can be expected. The EIS suggests that local governments base their wastewater management decisions not only upon knowledge of gradual erosion processes but upon the inevitability of significant storm damages in the coming years.

W-2. It is beyond the scope of the EIS to provide detailed engineering information about damage susceptibility. Only general guidelines were provided.

W-3. Many studies of the impact of boating on water quality have been undertaken (Barbaro et al. 1969, Cossin et al. 1971, Faust 1982, Furfari 1968, Furfari and Verber 1969, Mack and D'Itri 1973, Udell 1956, Udell 1957). Although findings are not consistent, there is widespread recognition that recreational boating activity can contribute to increased bacterial levels in localized areas (Bowerman and Chen 1971, Kidd 1975, Mack 1971, Seabloom 1969). Studies undertaken by the U.S. Food and Drug Administration indicate that only a small number of boats can exist in relatively large, deep marinas and still maintain the water quality necessary for shellfish to be safely grown (USFDA 1972, USPHS 1967). USFDA guidelines used by state shellfish officials state that pollution from boats is a public health problem and because of the highly variable and unpredictable contribution of fresh fecal material, it is necessary to close areas subject to boat pollution in the vicinity of shellfish beds during the boating season (USDHEW 1965). Many state and federal agencies require a 1000 foot closed buffer area around any marina. In some states the growth in marina development and the buffer requirement has resulted in the loss of significant amounts of shellfishing area.

The use of approved marine sanitation devices (MSDs) could further decrease the significance of this problem. Unfortunately, many boaters have not refitted older boats, and on many boats with approved MSDs, the devices are not being used as intended. Adding to this problem is the enforcement of reglations on MSD's and the limited number of marinas with pumpout facilities. A recent survey of North Carolina and Florida marinas noted such facilities at only 13 percent of the marinas and mentioned further that many pumpout facilities may not be operable because of infrequent use (Taylor 1983a, Taylor 1983b).

W-4. It is true that the sensitive natural and manmade environments of barrier islands have much in common with nearby coastal communities.

Five draft 201 Plans proposed similar facilities, and similar issues were raised during environmental review of these plans. These issues were unique in the barrier island setting. In addition, these five 201 Plans were submitted to EPA for review by barrier island communities within a few months of each other. EPA made the decision that the resolution of the issues raised by these plans should be carried out in a consistent and expeditious manner; hence, the decision to prepare an areawide EIS.

W-5. See W-2. In addition, natural processes are covered extensively in the Environmental Inventory Technical Reference Document.

W-6. Comment noted.

W-7. The North Carolina soil absorption system regulations require at least 48 inches of suitable soil for use of conventional ground absorption systems. These regulations allow for soil depths between 36 and 48 inches when special design and installation modifications can be made and at least one foot of naturally occurring soil is provided below the bottom of the nitrification trench. EPA has begun a study of North Carolina barrier island groundwater in areas served by soil absorption systems. This study will provide hydrological and water quality data which should help in the resolution of this question. (See Appendix.)

W-8. Costs were obtained from the EPA I and A Manual, EPA 430/9-78-009, updated to represent costs during November - December 1981 using the ENR cost index. Cost for pumping includes design of the pressurized distribution system. Attempts were made to obtain local costs for innovative systems, but installers generally had little experience with the systems.

W-9. Annual O&M of $20 is for power and minor repair parts. The pump and tank construction costs are comprised of:

$ 200	Pump
100	Controls
300	Tank
400	Design and Labor
$1,000	TOTAL

The pump O&M cost represents 10 percent of the purchase price per year. Typical life expectancy of these pumps is five to ten years; allowing an additional $20 per year for replacement, annuity will not change the EIS's conclusion.

W-10. With proper siting, design, installation and maintaining isolations, problems with on-site treatment and disposal should be minimal. These quality control measures should result in treatment systems with good performance and offset the need for special monitoring. Also, many previously platted small lots which may be developed have, in many instances, access to existing water supply mains and will not have to rely on individual wells. Therefore, groundwater monitoring costs were not included in the EIS.

W-11. Groundwater monitoring costs were not included in the EIS. Pressure dosing in traditional as well as mound type soil absorption system has, through field tests, produced a high quality effluent prior to movement in the local groundwater system. Nitrate concentrations may indeed need monitoring in light of systems being constructed solely on well drained, coarse textured sands which do not promote denitrification. If suitable space for a replacement system is provided and proper isolation distance requirements are maintained, then high concentrations of nitrates should not occur.

W-12. The EIS Strategy assumes public water for the principal source of supply since a much smaller percentage of individual wells are utilized on the islands. Most of the islands in question are going to off-island supplies since the limited island supplies cannot meet the demand.

W-13. Control of development densities is an important mitigative measure. However, the designation of areas for high and low density uses is a land use/zoning decision that is reserved by law to local governments.

W-14. On September 8, 1983, the Division of Environmental Management (DEM) adopted a set of rules which sets standards for groundwater on a state-wide basis. These rules will become effective January 15, 1984. Under these rules, a zone of treatment is defined as being the area 0.0 - 20.0 feet below the ground surface. Dilution standards are set for a series of parameters (nitrate, nitrite, chlorides, total coliform, etc.) which may be discharged in this zone of treatment. Standards were developed so that when discharges reach a depth of 20.0 feet, they constitute no adverse impacts on groundwater.

Those communities or individuals using the freshwater lens for drinking water supply should draw their supplies from below the 20.0-foot level. Where this depth is not feasible, a community may petition the DEM to declare the zone of treatment to be 0.0-10.0 feet below the surface and enforce standards accordingly. Given proper management and enforcement, the shallow aquifer should not be lost for drinking water purposes.

Developers and individual homeowners will have to size their drainfields and assure the distribution of effluent so that adequate renovation occurs in the zone of treatment. DEM is not able to project, however, whether or not the implementation of the new rules will alter prevailing development densities on the barrier islands (Mouberry 1983).

W-15. In the design of a spray irrigation facility, a detailed water balance is computed to assist in developing application rates. When proposing to dispose of sand filter effluent, fairly high loadings are possible per unit of surface area. In subsurface disposal schemes, wastewater applications are normally expressed in gallons per foot squared (gals/ft2) of trench or bed bottom area. An application of 1.0 to 1.2 gals/ft2 in this mode would be less if expressed in terms of gals/ft2 of actual surface area. Thus, applications in subsurface soil absorption systems are higher per unit of area.

W-16. A range of pollution levels has been detected in finger-fill canal developments. In a number of cases, levels were high enough to warrant closing nearby shellfish areas. Mr. Bob Benton, NC Shellfish Sanitation Office in Morehead City, can furnish more detailed information about the surveys his agency has conducted (919/726-6827).

The groundwater study now underway on several of North Carolina's barrier islands will provide additional information on the effects of on-site systems on groundwater level and quality.

W-17. An Atlas was sent to Mr. Little on September 6, 1983 for his review.

W-18. Comment noted.

W-19. The Construction Grants program has been delegated to the state of North Carolina, and through the review of facilities plans, mitigative measures are identified by the state and are included in these plans as part of a project. Mitigative measures are described in Environmental Assessments and Findings of No Significant Impacts (FNSIs) which are published by EPA on all projects receiving grants. In addition, EPA regulations require that a grant involving a wastewater management system using on-site systems be made to a management agency which could implement mitigation measures.

W-20. Many smaller lots such as those measuring 50' x 100' can be developed using on-site systems when certain conditions are met. See the Draft EIS, Appendix E, page E-3, for a lot diagram. Other typical lot configurations are also shown in this Appendix. The suitability of soils for development with soil absorption system is addressed in the DEIS on pages II-45 through II-54.

W-21. Many vendors have preassembled package treatment plants that only need a supporting concrete pad, electricity and minor plumbing work completed to be made operational. Local sanitarians or sanitary engineers could inspect a variety of systems and pre-qualify their design and construction.

Highly skilled individuals are not needed to inspect for proper operation of pumps and whether or not the chlorinator has run out of tablets (chlorine).

W-22. Technician(s) assigned to inspect the treatment unit on a daily basis can obtain a sample of the treated effluent and then utilize the services of a commercial laboratory for analysis and submittal to the reporting agency. Training of personnel is often provided by the vendor.

W-23. The agency responsible for the purchase, permitting and utilization of the treatment works should, through user charges, collect sufficient rentals to address hardware problems with the unit. NPDES permits regulate the volume and quality of discharge from such treatment plants. Therefore, local agencies, in the review of proposed subdivision plans or additions to existing development, can also evaluate the sewage treatment and disposal needs. Prior planning and municipal or local agency involvement with proper wastewater management can ward off potential problems with lack of maintenance and overloading due to unregulated customer usage.

W-24. Comment noted. Ongoing monitoring programs of the North Carolina Shellfish Sanitation Office (in the Div. of Health Services of the Dept. of Human Resources) continues to show that the closing of over 90 percent of the shellfish acres are caused by nonpoint source pollution from the mainland (Benton 1983).

W-25. Comment noted.

W-26. On-site systems (septic tanks) have been a satisfactory means of wastewater disposal on the North Carolina barrier islands for years when used with suitable soils and when properly sized, constructed and maintained. On-site systems are unsatisfactory in a few areas on the barrier islands where unfavorable conditions exist, such as finger-fill canal areas. The closed shellfishing waters throught to be caused by malfunctioning septic systems were determined to be a result of mainland activities rather than barrier island activities.

W-27. The EPA's charge is protecting water quality, not encouraging or discouraging growth. This EIS is designed to assist local communities in finding an affordable, environmentally sound means of providing wastewater management. This EIS addresses procedures for federally supported planning and grants related to resolving water quality and public health problems. It does not preclude communities from providing locally funded wastewater treatment facilities. The EIS approach allows flexibility for local governments to accommodate desired growth. The EIS neither promotes nor discourages development on the barrier islands.

W-28. The state of North Carolina determines the priority of proposed projects mainly on the basis of demonstrated water quality problems and the ability of the project to solve these problems and restore the intended water use.

W-29. See W-27.

W-30 Studies such as the one by B. L. Carlile and C. G. Cogger, Movement and Fate of Septic Tank Effluent in Soils of the N. C. Coastal Plain document that the most important factor affecting movement and treatment of effluent was the location of the water table. "Those systems which were nearly continually saturated had the highest concentration of contaminants in the groundwater and the farthest movement."

This study also showed that renovation of the wastewater was improved in shallow, somewhat poorly drained, coarse textured soils with the low pressure pipe (LPP) distribution system. This report concludes that with proper siting, design, and construction LPP systems can provide good levels of wastewater treatment. One case study with a mound system demonstrated to the study team that it was capable of providing excellent treatment.

W-31. Much of the cost information contained in the draft 201 Plans was incomplete, and the average user costs were therefore inaccurate. These costs were recalculated in the Draft EIS and are shown in Figure II.21. Typical household monthly user charges with funding assistance range between $17.10 and $36.35. These costs are premised on 75 percent matching funds from EPA. However, this level of assistance will drop to 55 percent on October 1, 1984 for grant-eligible components. At that time, costs will be significantly higher than those mentioned above.

W-32. See W-27.

W-33. EPA expects all barrier island communities presently enrolled in the National Flood Insurance Program to fully comply with its provisions. Enforcement provisions lie with the Federal Emergency Management Agency.

W-34. Comment noted; see W-35.

W-35. EPA agrees that there are no guarantees that on-site or small community systems will be the selected alternative after any 201 Plan is updated. However, these alternatives will be fully considered, and EPA will participate only in the funding of an alternative that is environmentally sound and cost-effective.

After October 1, 1984, the 201 Construction Grants program will place a prohibition on the use of federal funds for conveyance or treatment capacity beyond that necessary to serve existing population at the time of the Step 3 grant award or 1990, whichever comes first. Very little latitude will exist for overestimation of future population.

W-36. EPA shares your concerns; however, the agency believes that the procedures developed by this EIS will require a realistic appraisal of wastewater treatment needs for barrier island communities. The No Federal Action Strategy would leave certain water quality problems unresolved and would increase the probability of future problems. EPA believes that the beneficial features of the EIS Strategy of solving existing problems and preventing future problems, along with the safeguards built into the procedures, make it the best approach to take.

W-37. Development densities will be approximately comparable under the EIS Strategy and the No Federal Action Strategy. The EIS Strategy provides a better planning framework, however, and it is expected that local land use decisions will be based on more accurate information. As a consequence, nonpoint source pollution is expected to be less severe under the EIS Strategy than under the No Federal Action Strategy.

W-38. Regardless of the provision or lack of provision of federal funding assistance, it is expected that the North Carolina Division of Environmental Management or the North Carolina Division of Health Services will require that water quality standards be met by local wastewater facility operators.

W-39. Comment noted.

W-40. See W-[illegible]7.

W-41. Since the EIS began, several significant changes have occurred in EPA's Construction Grants program. In December, 1981, Congress enacted and the President signed amendments to the Clean Water Act. Among other actions, these amendments provided for 1) a lower authorization for construction grants than had occurred in previous years; 2) a reduction in the federal share of construction costs from 75 percent to 55 percent for all projects approved after September 30, 1984; 3) a prohibition on the use of federal funds for conveyance or treatement capacity beyond that necessary to serve the population existing at the time of the grant award, or 1990, whichever comes first; and 4) elimination of grants for conventional collector systems after September 30, 1984, except that a governor may elect to use up to 20 percent of a state's allocation for collectors or other previously eligible projects. These changes and others are described in detail in Construction Grants 1982 (EPA 1982). See Final EIS Chapter II.D, Implementation of the Recommended Strategy.

W-42. Projects which have been in the planning stage and have a low priority on the N.C. State Priority List have been administratively closed. Should the priority change, the applicant can elect to reopen the project and proceed with planning.

EPA recognizes the reduction in funding levels from both federal and state governments. The state's priority system should assure that the projects which have demonstrated water quality problems and the ability to restore intented water uses will have priority over other proposals for use of these limited funds. The funding situation should not preclude communities from providing locally funded wastewater management systems.

W-43. EPA Region IV has initiated work on a program to test the groundwater model at three sites along the barrier island chain. The findings should be published toward the end of 1984. (See Appendix.)

W-44. Comment noted.

W-45. The Construction Grants program was delegated to Division of Environmental Management (DEM) in 1980. The 201 program will be coordinated with the Office of Coastal Management, also within the N.C. Department of Natural Resources and Community Development.

W-46. See W-16 and W-24.

W-47. Local sanitarians have attended some of the EIS workshops and have had an opportunity for comment.

W-48. EPA believes that the potential impacts to commercial and sport fisheries and other environmental impacts were discussed in as much detail as necessary to evaluate the alternative strategies considered in this EIS. The EIS Strategy has been determined to have the greatest benefit to the environment among the alternatives considered. Since this is an areawide EIS which is considering strategies for wastewater management planning and is not evaluating the site-specific projects (which are yet to be determined), it would not be possible to produce meaningful cost figures for impacts to specific resources.

W-49. EPA agrees that sound land use planning practices are important nonstructural tools in the provision of wastewater management services. However, federal agencies may not usurp the prerogatives of local governments. See W-13.

W-50. North Carolina does not permit surface discharges to SA waters, and the use of ocean outfalls requires only secondary treatment. The issue of tertiary treatment does not arise.

W-51. Flood proofing of wastewater facilities in flood prone areas is a sound engineering practice which would undoubtedly be required by state agencies.

W-52. The evaluation of impacts on fish and wildlife resources was an integral part of the EIS process.

W-53. Septic systems which were not properly installed, operated and maintained were found to be associated high bacterial counts. EPA believes that septic system technologies (conventional as well as innovative and alternative systems) are fundamentally sound and work well when properly managed. In addition, see W-16.

W-54. See W-53.

W-55. EPA does not agree that properly managed septic systems will produce higher levels of pollution, more impacts to sensitive natural areas or greater loss of beachfront habitat than will the implementation of the 201 Strategy. The authors of the draft 201 Plans claim that central systems are needed to alleviate water pollution and improve shellfishing; the EIS did not substantiate these claims.

W-56. The EIS Strategy is designed to assist communities in planning for the most cost-effective and environmentally sound wastewater management system for their specific situation. The EIS determined that the adverse impacts to fish and wildlife resources will be minimized with the EIS Strategy and the least cost alternative would be determined.

W-57. See W-48. In addition, a worst case analysis would not be meaningful in an areawide EIS which is providing a strategy for wastewater management planning.

W-58. The EIS Strategy is designed to result in planning for wastewater management systems which are the most environmentally sound. Also see W-48.

W-59. With the continual use of septic tank soil absorption systems, it is assumed that this system will be properly sited, designed, and installed. Providing these conditions are satisfied and that normal routine maintenance is performed on the systems, a fairly good quality effluent would be all that would percolate downward to the local water table. In a properly functioning soil absorption system, all of the required biological and chemical treatment takes place in the overlying, unsaturated one to two feet of soil.

When the effluent reaches a moist or anaerobic environment, such as the mud deposits, some nitrates will be reduced by denitrification, resulting in lesser amounts of nitrates available for movement to adjacent waters. Also, as the waters flow toward the back bays during low and neap tides, the carbon-rich and anaerobic wetland vegetation should afford an additional opportunity for denitrification and loss of N_2 gas.

W-60. The procedures and tools developed by the EIS should provide for the identification of the potential effects on groundwater recharge and movement of the saltwater-freshwater interface resulting from export of treated effluent whenever on-island water supplies are used. The groundwater model developed for this EIS and now being demonstrated by an additional study is designed to provide this information. (See Appendix.)

W-61. Comment noted. However, the personal incomes of most year-round residents remain relatively low, and they cannot afford high user charges for wastewater management systems.

W-62. "...continual repair and/or upgrading of septic tanks" appears to be an exaggeration. All mechanical systems, whether small scale or centralized facilities, require a certain amount of maintenance and repair.

W-63. The EIS has determined that for certain situations a combination of systems may be the most cost-effective in the long term as well as short term. In addition, this combination of systems may also provide the most benefits for the environment.

W-64. See W-13 and W-49.

W-65. Comment noted.

W-66. Soil absorption systems in North Carolina must, by law, maintain a minimum of 1.0 foot separation between the bottom of any proposed system and seasonally high water. Therefore, if properly installed, most soil absorption systems will have greater than 1.0 foot of unsaturated soil above the water table for much of the year. For example, the Corolla fine sand has a seasonally high water table 1.5 to 2.0 feet from the surface, and during the drier summer and early fall months, the water table may be as deep as 6.0 to 8.0 feet below the surface (see W-7).

Improper interpretation of the water table location in this soil could result in flooded trenches and widespread movement of contaminants during the wetter months. Therefore, the key to proper placement of these systems is to have detailed soil interpretation from trained soil scientists who can properly identify the upper limits of groundwater movement in the soil profile. The Draft EIS identified certain modified on-site systems which could be placed in an area with 12 inches or greater to the seasonal high water table. Conventional systems without any modification require a minimum of 48 inches to seasonal high water table. (See W-7.)

W-67. EPA agrees that increased development under any of the strategies will lead to increases in nonpoint source pollution, although at differing levels. Sound land use planning and Best Management Practices (typically recommended in a 208 Areawide Water Quality Plan) should be implemented by local governments to reduce and control such problems.

W-68. Income figures for second home residents are not available since the U.S. Census counts them at their primary residences. Moreover, many second homes are only used a few weeks per year, and the real economic burden falls on the year-round residents.

W-69. Comment noted.

W-70. Comment noted.

W-71. Documentation concerning impacts caused by waterfowl populations is found in the Environmental Inventory Technical Reference Document on page 2-15. Morris and Benton may be contacted for further information.

W-72. See W-13 and W-49.

W-73. The intent of the paragraph was to state that topographical modifications will be minor.

W-74. Limiting density is a valid mitigative measure and must be implemented by local governments, not EPA. Floodproofing of central facilities was addressed in W-51. Development of tertiary treatment facilities is a moot point; see W-50.

W-75. Comment noted.

C. Public Hearing Transcripts

This section of the Final EIS contains the transcripts of the three public hearings. The following corrections have been made by EPA Region IV for ease of reading.

Bolivia Transcript

p. 15, line 7	"page 330" should be "page III-30"
p. 18, line 21	"pervading" should be "prevailing"
p. 41, line 15	"choliform" should be "coliform"

Pine Knoll Shores Transcript

p. 2, line 8	"Gallveci" should be "Galucci"
p. 20, line 22-25	"Gallveci" should be "Galucci"
p. 23, line 1	"package plan small septic tanks" should be "package plants and small septic tanks"
p. 28, line 8	"cenogenestic" should be "synergistic"
p. 29, line 10	"Denton" should be "Benton"
p. 29, line 13	"qualitary associates" should be "Claude Terry & Associates"

Manteo Transcript

p. 1, line 19 ff	"Crumm" should be "Crum"
p. 1, line 21 ff	"Claud" should be "Claude"
p. 14, line 18	"fate complete" should be "fait accompli"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

NORTH CAROLINA BARRIER ISLANDS WASTEWATER MANAGEMENT ENVIRONMENTAL IMPACT STATEMENT

DRAFT EIS PUBLIC HEARING

August 23, 1983

Bolivia, North Carolina

The public hearing in the above-captioned matter commenced at 8:00 P.M., in the Public Assembly Building, Brunswick County Complex, Bolivia, North Carolina, Howard Zeller, Assistant Regional Administrator, United States Environmental Protection Agency, presiding.

PROCEEDINGS REPORTED BY:

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PROCEEDINGS

MR. ZELLER: It is a little after 8:00. I think I would like to go ahead and formally open the hearing. If anyone comes in late, we can still accommodate them.

I am going to come up here and use this area for giving my statement, and ask all of you that give statements to please do the same, to come up to the podium and identify yourselves and whom you may be affiliated with so that we will have your name on the record and we can respond accordingly to you when the final Environmental Impact Statement is completed.

Can everybody hear me all right?

First of all, let me welcome all of you to the public hearing on the draft Environmental Impact Statement which addresses wastewater management for the North Carolina barrier islands. Let me introduce myself to you. My name is Howard Zeller, and I am the Assistant Regional Administrator for the Southeastern Region of the United States Environmental Protection Agency. My office is in Atlanta. We are holding, as most of you know, a series of public hearings on the barrier islands EIS. This is the first in a series of three hearings that we will be holding on this EIS.

With me is Mr. Bowman Crum. Bo Crum is the project officer for the Environmental Impact Statement and has been heavily involved in a lot of the scoping meetings and activities that have taken place relative to development of the document. Bo will be speaking a little bit later on some of the technical aspects of the EIS.

I would like at this time also to recognize Bob Jamison, who is Regional Manager for the Department of Natural Resources and Community Development for the State of North Carolina. He is in the audience and we may ask you, Bob, to respond to an issue should something come up. We are very happy to have you here. As you know, we believe very strongly in a Federal-State partnership as we pursue our environmental activities throughout the Southeast Region.

The purpose of the hearing tonight is to receive public and other agency comments on the Draft Environmental Impact Statement for the North Carolina Barrier Islands. This EIS provides guidance and procedures for local governments and their contractors to assist in planning for wastewater treatment facilities. The preparation of a facilities plan is the first step in EPA's three construction grants programs for wastewater treatment. To be eligible for Federal funding, proposed facilities must be a part of an approved facilities plan. The plan must identify the least costly means of resolving public health and water quality problems resulting from improperly treated sanitary wastewater.

Steps two and three of the construction grants program are for design and construction, and these steps follow completion and approval of the facilities plan.

All but one of the draft 201 facilities plans for the North Carolina barrier islands have proposed the construction of extensive wastewater treatment, collection, transportation and treatment facilities to serve large portions of these islands. After an environmental review of the proposed facilities, the Environmental Protection Agency has some significant concerns about the potential impacts and the cost of these facilities on the user public.

The National Environmental Policy Act, or NEPA as it is called, requires Federal agencies to prepare an environmental impact statement on major Federal actions that significantly affect the quality of the human environment. Because of the environmental complexities and the water quality issues involved in these projects, the Environmental Protection Agency made a decision to prepare an environmental impact statement. Accordingly, in September of 1980 the notice of intent to prepare an EIS was issued. The public hearing is being held here tonight to receive comments on that draft EIS. EPA wishes now and always to encourage public participation in the Federal decision-making process and to develop improved public understanding of Federally-funded projects.

The draft EIS was made available to the public in EPA's Office of Federal Activities on July 11, 1983, and it

was listed in the Federal Register on July 15, 1983. The draft EIS comment period will extend until August 31, 1983. Comments received this evening and during the comment period will become a part of the record.

Before I take any testimony from the floor, and a number of speakers have indicated they wish to present testimony, I am going to ask Mr. Crum who is with me to provide us a summary of the Environmental Impact Statement, and I hope that all of you here will feel free to raise questions at any point in the proceedings here to facilitate your understanding of what the Environmental Impact Statement is to cover and what we hope to accomplish. So in the process of discussing with you and letting you know the government's intent, let me ask Mr. Crum to come up here and give a statement which will summarize what is in the Environmental Impact Statement.

MR. CRUM: Thank you, Mr. Zeller. This draft Environmental Impact Statement, or EIS, has been prepared in response to issues raised during the review of five 201 Facilities Plans. These plans, as Mr. Zeller indicated earlier, propose the construction of wastewater collection, transportation and treatment facilities to serve large portions of North Carolina's barrier islands.

Through the EIS process, wastewater management alternatives for the barrier islands were developed and evaluated, and a strategy is proposed.

The review of these draft 201 plans and the scoping process for the EIS identified six basic issues to be addressed. The issues and the major conclusions of the EIS are as follows:

1. Water Quality. It is important to identify existing water quality problems in order to determine the need for additional wastewater facilities. The draft 201 plans pointed to septic tanks on the barrier islands as the reason for closed shellfishing waters. The data reviewed through the EIS process do not confirm this conclusion. Surface runoff from the mainland appears to be the cause of the closing, except in a few isolated cases.

2. Alternative Wastewater Techniques. The draft 201 plans do not fully evaluate on-site and small community system technologies for wastewater management on barrier islands. The EIS has found that these systems may provide more cost-effective solutions to solve existing water quality and public health problems while providing for desired development. The EIS proposes additional site-specific analyses of these alternatives.

3. Financial Impact on Local Governments. Providing wastewater treatment is a major financial undertaking for a community and its residents. The financial and management implications to the local governments and the system users

can be significant. The draft 201 plans do not demonstrate the financial and institutional capability of these communities to support the proposed system. The EIS provides guidance for local government to evaluate and resolve these potentially severe impacts.

4. Nonpoint Source Pollution. Shellfishing waters have been closed where sewer systems exist in coastal areas of the Southeast. Studies have shown many of these closures to result from nonpoint runoff. New wastewater facilities may promote high density development, thus increasing the potential for nonpoint source pollution of estuarine waters.

5. Groundwater. The potential impact on groundwater hydrology and groundwater quality is a major issue when considering soil absorption wastewater systems. Although few of the barrier island communities use the surficial aquifer for water supply, the effects of any proposed system on groundwater should be carefully considered.

The EIS proposes a method for determining the water table response to soil absorption disposal of wastewater. The EIS also recommends collection of data in certain instances. EPA has initiated a study which will demonstrate this water table response method and will collect groundwater quality date for three locations on the North Carolina barrier islands. The information from this study, along with the method developed by the EIS, should significantly improve the ability to predict the impact on groundwater from soil absorption disposal. The results from this study should be available by the end of next year.

6. **Sensitive Natural Areas.** The primary and secondary impacts of wastewater facilities on sensitive areas such as dunes, wetlands and estuarine areas should be considered in planning for wastewater management or wastewater facilities.

The EIS process included several steps. First, an inventory of existing conditions was prepared. Next, alternative wastewater management strategies were developed. Third, the strategies were evaluated, aided by using a case study. Finally, the entire process was summarized and published in the draft EIS.

I would like to now summarize the strategies addressed by the EIS. They include the proposed EIS strategy, the 201 strategy, and the no federal action strategy.

A special strategy is developed in this EIS. This approach is intended to provide assistance to local governments in planning for wastewater management. The approach encourages communities involved in facilities planning to update and revise their draft 201 plans as appropriate using special procedures developed by this EIS.

The procedures developed by this EIS refine those normally undertaken in the preparation of a 201 plan. The procedures are consistent with 201 construction grants

regulations and other facilities plan preparation guidance and are tailored to address the unique environmental and socioeconomic conditions on the North Carolina barrier islands. The procedures are designed to address the six issue areas identified earlier. Special attention is given to two areas: a thorough evaluation of potentially reasonable wastewater technologies, especially on-site and small community systems; and the financial and institutional impacts of operating and maintaining wastewater management systems.

The procedures fall into three major groupings: determining need and estimating flows; developing alternative wastewater management systems; and evaluating these alternative systems. An overview of these procedures, which is Figure 11.1 in the draft EIS, is part of the handout you received tonight. The procedures are described in detail in the draft EIS and the Alternatives Development Technical Reference Document.

The EIS has compiled information and developed tools which will be helpful to those planning for wastewater management. These tools include a computerized data base of natural resource information, details on wastewater management options, on-site wastewater treatment and disposal system siting criteria, a financial planning handbook with worksheets, and a predictive groundwater model. These procedures and tools are designed to allow identification of all viable alternative systems and to promote consideration of the major potential impacts on both the man-made and natural environments.

The EIS compared the proposed strategy to the alternatives of no action, or the no Federal action strategy, and of approving the draft 201 plans as submitted, the 201 strategy.

The no Federal action strategy would be a decision by EPA not to participate in further planning or funding of wastewater management facilities in the study area. The analysis of this strategy concludes that there would be continued growth on the barrier islands regardless of whether publicly-owned and funded facilities are constructed. Without additional EPA assistance, existing wastewater management practices are likely to continue. Localized state regulations would govern the use of soil absorption systems. Individual property owners would be responsible for providing adequate treatment and would bear the cost of renovating failing systems or installing new facilities.

The 201 strategy would be the approval and implementation of the draft plans without significant changes. The plans would have to be updated in certain areas such as costs. Those plans proposing ocean outfall, Dare County and Carteret County, would have to incorporate the results of site-specific outfall surveys. The Carteret County plan for the barrier islands would have to be modified since one of the two

communities involved elected not to participate.

One of the six plans, Hatteras Island, proposed no action because it was determined that a system is not economically feasible at this time. The other five plans exhibit several similarities. Each plans calls for the replacement of existing on-site wastewater systems, the septic systems, with centralized collection, transmission, treatment and disposal systems. These plans justified the need for facilities based on the belief that shellfishing harvest area closings were caused by existing on-site systems. The plans also projected additional shellfish area closings with continued residential and commercial development using on-site systems.

Another similarity is the proposal to provide sewer lines to most areas of these communities. Pumping stations and force mains are to be used in all facilities to transport effluent to the treatment plant. Secondary treatment is proposed for each facility. Ocean disposal is proposed in Dare and Carteret Counties, spray disposal in Topsail/Surf City and southwestern Brunswick County, and surface water discharge to the Cape Fear River in southeastern Brunswick County.

The EIS developed strategy is proposed as a means of assisting local communities in finding a cost effective affordable means of providing wastewater management. The approach is designed to allow maximum flexibility for local governments to accommodate desired growth.

The EIS concludes that the 201 strategy could result in costly systems which could produce adverse secondary impacts to local governments. The no Federal action strategy would leave certain water quality problems unresolved and could increase the probability of future problems. No Federal action would likely eliminate the continuation of facilities planning.

The EIS strategy incorporates the following beneficial features: the procedures promote documenting and then resolving water quality problems; the procedures provide flexibility for meeting existing and future wastewater management needs; the procedures promote maximum local decision-making and provide for disclosure of financial and institutional impacts; and the procedures minimize costs to communities by promoting consideration of less expensive alternatives.

The construction grants program has been delegated to the state of North Carolina. Any future wastewater management projects will have to meet state requirements. To receive funding, any project must be eligible for funding based on its position on the state priority list. Also, any project to be funded must meet the construction grant regulations applicable at the time of funding.

I look forward to receiving your comments. Suggestions for improving the methods proposed in this EIS for wastewater management are most welcome.

Mr. Zeller.

MR. ZELLER: Thank you very much, Mr. Crum. Before we go ahead and ask for comments from the audience, I would like to remind all of you that we would like to have you register at the front desk so we can have a complete attendance list of everybody that is here tonight. If you wish to speak, I am assuming you so indicated on the registration cards. I will call on speakers that have indicated their interest in speaking in just a little while. If you have not indicated an interest in making a statement, and after the hearing proceeds if you would like to make a statement, you will be given an opportunity to do so.

I would like to start off now with the real purpose of this hearing, which is to receive comments from the public relative to the Draft Environmental Impact Statement, and I would like to ask the first speaker who has registered with me, Mr. John B. Harvey, who is Assistant County Manager representing the Planning Board of Brunswick County, to please come forward. As you come forward, Mr. Harvey, would you please identify yourself for the record and proceed with your statement.

STATEMENT OF JOHN B. HARVEY, ASSISTANT
COUNTY MANAGER, BRUNSWICK COUNTY, N.C.

MR. HARVEY: I am John Harvey, Assistant County Manager, Brunswick County. My remarks are made as an official presentation on behalf of the Planning Board of Brunswick County with the concurrence of the Board of County Commissioners.

1

Mr. Zeller, the future posed to Brunswick County by Alternative 3 selected in this EIS is, in our opinion, full of false assumptions on the part of EPA. First, the population projection used, page 330, shows EPA using an estimate of 68,500 persons as permanent residents of Brunswick County by the year 2000. In the recent publication, "The Future of North Carolina: Goals and Recommendations for the Year 2000" by the Commission on the Future of North Carolina, which commission has as a resource the Research Triangle Institute and the major universities of the state, and includes among its membership such personages as the President of the Consolidated University System of North Carolina, the permanent resident population of Brunswick County to the year 2000 is projected at over 82,000 permanent residents. That is just 17 years from now.

2

By careful documentation, we find that over 4500 housing units have been added to the inventory of Brunswick County by April 1, 1983, over the number reported just 3 years before, April 1, 1980, by the Census. That is way over a 20 percent increase in the total housing inventory in a three-year period. We find that of these new housing units, 2300 were occupied by new permanent year-round residents. This was an increase

of 19 percent in a three-year period over that reflected in the 1980 Census.

The number of permanent residents increased by April 1, 1983, from 35,777 reported as of April 1, 1980, to over 42,000. That was a significant increase, over six percent a year, for each of these three years. That growth rate is now accelerating. EPA should be aware that with a permanent resident population of this size, in addition there are over 75,000 separately owned land parcels in Brunswick County.

3

We just sent out our tax bills -- I have the records. Most of these are small lots, 50 by 100 feet. That is all they are, and they are going to live on them some day, these retired people as they come in.

There is no way that septic tanks can be erected under the laws of North Carolina in such conditions. The municipality of Long Beach, as one illustration, has over 10,000 lots of record already, separately owned.

On page 45, the statement is made: "It is generally assumed by state and local officials that the same number of persons will be attracted to the North Carolina barrier islands regardless of what type wastewater management systems are provided." Mr. Crum, you repeated this in your preliminary remarks. I can assure you that assumption is not shared by the health officials of the state or of Brunswick County.

Before your deadline one week from today, of August 30, Steven B. Martin, who was Health Director of Brunswick County until early in August, and is now in charge of the Division of Health Services for the eastern one-third of North Carolina, will file a report with you testifying to the effect that development not only of the barrier islands but also of related mainlands -- a term we still wonder what you mean by -- will not be possible under the present pattern of land ownership and lot ownership with septic tanks as the general mode of wastewater treatment without major increase in water pollution.

3

We are not sure what you mean by "related mainlands." I have personally asked that question since the inception of the EIS, and asked that you define that term so that we would know what we are dealing with and what you are dealing with in our county as to the impacts upon us.

4

We again point out that over 76 percent of the permanent residents of this county are not in any of these 14 municipalities, these barrier island communities, but are permanent residents in a definitely emerging urban confluence that would have over 80,000 people in it on the mainland across from the islands, and with 50 by 100 foot lots, which is all they have, septic tanks or even the most innovative systems imaginable are not an acceptable substitute.

5

I have not dealt with the issue yet of the seasonal resident numbers. There are too many conflicting opinions as to what that increase in our population is. I am not sure,

but I hope you are aware, that the so-called "cottages" along our beaches are indeed commercial operations ranging in some municipalities from an average of eight bedrooms per cottage to, in others, an average of 12 bedrooms per cottage. That is a significant increase in population for what has been a five-month season and is an expanding season from all reports. That is a lot of additional people for peak loads.

6

Septic tanks, innovative individual wastewater treatment sytems, and packaged treatment plants for individual apartments or condominiums or malls or what have you are an inadequate future. We must have as a minimum community wastewater treatment systems. We urge this EIS be re-evaluated as to its findings. We are apprehensive of the impact of this EIS.

7

We are aware that domestic programs are a thing of the past. We are not looking to that. The joint municipalities of Oak Island (phonetic), which includes Caswell Beach, Yaupon and Long Beach, are today and have been for some months in dialogue as to the public sector at least providing a community traditional wastewater treatment system for that 12-mile long urban area. Is the impact such that inadvertently the pervading process would not permit local governments to meet their destiny regardless of the fact that we know there will be no Federal monies available?

8

Recently we have had to "close out" the 201's in Brunswick County. We did so with an understanding with the

9

state that these were left open ends, at our demand. I received a call yesterday from the EPA office in Atlanta that we had to bring five forms assuring this was a total close-out.

9

In your draft, Technical Reference Document Alternatives Development Report, page 46, you make the statement: "EPA proposes to make additional step funds available." Walter Taft, Head, Construction Grants Section, Environmental Management Division, North Carolina Department of Natural Resources and Community Development, assures me at my repeated calls that in March, and April, May, June and July EPA has demanded that the 201's of the barrier islands related mainlands be closed out. At first, we thought perhaps the left hand of EPA did not know what the right hand of EPA was doing. Here you are saying, "We are going to move onward," and you are going to give us more money to do it. On the other hand, the state tells us they absolutely and and totally are to be closed out and that is the end of it. We need answers to these things.

This was the end of what I had prepared. Until review with others, we are apprehensive that the study has been done with more consideration to nature than to man.

MR. ZELLER: Let me make a brief comment.

MR. HARVEY: I will have no further comments.

MR. ZELLER: Fine. Let me comment then on your comments.

The reason we are here, of course, is to receive a reaction from you and others and to raise whatever questions that you think are pertinent in terms of the document that we have presented. You have raised some very cogent issues, in my opinion, and very clearly the purpose of our holding a hearing on a draft EIS is to assess on the part of you and other individuals whether our data base needs to be modified in some cases, as you pointed out in population projections, and whether we need to address certain issues in the final EIS when it is finally promulgated, and it will be promulgated in a short period of time after we hold the hearing on the draft.

Secondly, let me just simply comment by saying that I do not believe that we meant to imply, or did not imply -- let me clarify that. We did not intend to imply in any way in the process of presenting the strategy that septic tanks were the only system that was available in terms of wastewater treatment. We simply implied that a strategy should be applied on a case-by-case basis to all particular situations, and combinations of whatever is the best environmental solution to that problem should be utilized rather than accepting an up front assumption that the only way we could accomplish what we want to accomplish is by building a regional system and a regional collection system which could be very costly and not as effective in terms of getting the job done.

MR. HARVEY: I no longer advocate a regional system. My remarks said "community systems," Mr. Zeller.

MR. ZELLER: Thank you. I appreciate your comments. They are good comments and they will be responded to in the final EIS. Thank you very much.

Next I would like to ask Mr. Paul Denison, who is Vice President of Henry von Oesen and Associates. He is representing several of the coastal communities here. Mr. Denison, please state your name for the record, and we will be pleased to receive your comments.

STATEMENT OF PAUL S. DENISON,
HENRY VON OESEN AND ASSOCIATES

MR. DENISON: Mr. Zeller, Mr. Crum, ladies and gentlemen, as mentioned, I am Paul Denison of Henry von Oeson and Associates, Consulting Engineers and Planners in Wilmington, North Carolina. We represent not only our own views, based on many years of engineering planning and design experience on the entire southeastern seabord, but also the interests of numerous communities that we serve in the coastal area of North Carolina. Thus, we appreciate this opportunity to comment on the North Carolina Barrier Islands Wastewater Management Draft Environmental Impact Statement.

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We feel that this EIS exercise by EPA has imposed what we feel is an unconscionable three-year delay in resolving

treatment and disposal problems on the North Carolina barrier islands. During this delay period, the costs for all alternative solutions to the problem have escalated considerably. The total amount of Federal funds allocated to the state of North Carolina for corrective actions has been diminished by attritional use and by budgetary cuts. The state's Clean Water Bond Act grant fund which is used for matching Federal grants has been depleted. As a primary result of the moratorium on actions imposed by the IES drill that we have been going through, all barrier island projects on the North Carolina Construction Grants Funding List have slipped in priority so that funds for facilities design and construction will not now be available until Fiscal Year 1986 or after. By that time, the Federal participation portion will be limited by law to 55 percent of the eligible project costs, rather than the 75 percent enjoyed at present.

In view of these developments, it is impossible to accept the fact that the so-called EIS Strategy calls for further revisions to the 201 Facility Plans which will result in further bureaucratic delays in resolving the problems that exist. Several local units of government, completely frustrated by these events, have wisely elected to abandon the 201 Facilities Planning process entirely and to pursue other viable solutions independent of the EPA Constructions Grants process, as just mentioned by John. This abandonment actually may be an EPA objective, but in our opinion it was not Congress' intent when they passed Public Law 92-500.

In summary, and as a considerable oversimplification, the EIS recommends the continued use of septic tanks and so-called "community systems" as the least-cost solution to existing wastewater disposal problems. Mr. Crum gave us a very concise run-down, I think, on the ingredients included in the barrier islands strategy. As Mr. Zeller just mentioned, this does not finitely conclude that septic tank sytems must be used, but I think the EIS strategy proposed in the report is pretty implicit in its intent.

We feel that this position is inconsistent with recent scientific research and even prior EPA studies which show that septic tanks do cause pollution of surface and ground waters, and we have attached to this letter a series of references which we think are extremely pertinent, only a part of the reference files that are available on this subject.

We feel that the inadequately supported and less than scientific position taken in the EIS will only exacerbate existing problems, not really solve them.

Many of the Barrier Island 201 Facility Plans which preceded the EIS showed that central sewer systems could be designed and constructed with Federal and state grant assistance for user fees in the range of $12 to $18 per household. In all proposals we are familiar with, wastewater contaminants

were effectively removed from the barrier islands, their related groundwater systems, and their adjacent fragile estuarine waters.

We get the impression -- and I think it was reiterated again -- that EPA simply did not want to fund any of these projects or solutions recommended in the 201 Plans based on the fear that solving a sewage disposal problem would stimulate growth on the barrier islands. However, despite the delays and lack of aggressive action to resolve wastewater disposal problems, significant growth has occurred in all areas, all the barrier island areas along the North Carolina coast. Again, I think that John's very concise summary of what has happened in Brunswick County is only partially exemplary of what we have been experiencing during the three-year hiatus that we have been in along the entire North Carolina coast.

Now the Federal funding picture has altered to a state of unfavorable economics, but the development and increasing pollution potential goes on and increases. More septic tank and so-called community systems, the cluster systems describ in the EIS strategy, are simply not the answer. We need to get on with the business of truly resolving the problem, not restudying it.

Enough time and money has been wasted already. We are confident that time will continue to demonstrate that this proposed EPA Barrier Island EIS expenditure of time and money has been another futile exercise that produces no solutions to what we feel seriously is a continuing and growing problem.

Mr. Zeller, we thank you for the opportunity to make this statement.

MR. ZELLER: Thank you for your statement. We would be very much interested in pursuing the technical references that you cited. Certainly we will make every effort to be sure that our technical and scientific data base is accurate in terms of the statements that we have made. I appreciate your providing that information and your opinions are also appreciated.

I agree that the growth issue clearly has to be analyzed and if what we are talking about in terms of population projections is different than what we proposed in the EIS, then that absolutely has to be looked at.

The other issue I will not try to get into in detail because it is a very complex issue, and I do not have to tell you, Mr. Denison, you are very familiar with how priority lists work relative to receiving grant dollars to build needed facilities throughout the state of North Carolina, and through the Southeast and throughout the United States. There simply are not enough grant dollars to go around for all of the projects that have been identified, and the priority list is a process whereby the state implements a

procedure of placing projects on priority lists and funds those in accordance with a certain formula. There have been problems, as I understand it, relative to facilities reaching the stage where they could be funded on a priority list, which is no one's fault. We are simply short on dollars and have need for facilities. Perhaps we might want to have some comments on that.

Mr. Jamison, do you have anything by way of a comment along those lines? Hopefully, you agree with the general statement that I made. The priority system is a system in place in North Carolina and one that we all have to operate under, but certainly we want to do everything we can relative to this strategy to try to see that we get the job done.

Thank you very much for your statements, and we will respond to those in the final EIS.

The next speaker that I have is Mr. Don Willets, who represents Alternative Systems in North Carolina.

Mr. Willets, are you here, sir?

STATEMENT OF DONALD WILLETS,
ALTERNATIVE SYSTEMS, NORTH CAROLINA

MR. WILLETS: Mr. Chairman, distinguished guests, ladies and gentlemen, I am not a speaker; I am a country boy. You will have to excuse me for not having my jacket on up here.

I represent Alternative Systems. We hold the franchise the territory for Jet, Incorporated. Jet carries our own plant system, as you are referring to in 201.

Let's go back for a few minutes, and let me say this. The situation here reminds me of the preacher who moved to the mountains. It took him all week to get his family moved so he could hold services on Sunday. He got up Sunday morning real early, at the crack of dawn, took his mule and went over to the church and, lo and behold, there sat one parishioner sitting on the church steps waiting for him. They talked and carried on until something after 10:00, and the preacher turned to the farmer and said, "Sir, what do you do in a situation like this?"

He says, "Well, when I go out to feed my cows, I take a load of hay." He said, "Whatever cows show up," he says, "I feed them."

The preacher says, "I understand. Let's go inside." They went in and the preacher commenced to put on his sermon, and he done a real good job, and he come out at the end and he said, "What do you think of my sermon?"

He says, "Preacher," he says, "I didn't tell you if only one cow showed up I gave him the whole durn load of hay."

Now, with that in mind, I am not going to try to get into full details of what the Jet system does or does not do, and try to get into any arguments about wastewater treatment versus septic tanks.

Let's take a short look at the span of life we have

come here in. When we landed on these eastern shores of North Carolina, when we hit the land it was a relief to get off the boat. We found from farmers that we had made a mess that they had to avoid. So then we found if we got near a stream, water, or whatever, we disposed of that, because only .004 percent of your waste is solid; the rest of it is all water.

From there, they learned what the Indians did. They camped near the watergrounds, or whatever, and let the streams take care of it. In the Boy Scounts, along those lines, you find that if you walk downstream for 100 feet or so, you can drink the water and it is purified and it is clear and it is good water. DEM tells us this today. We can dispose of it if it is treated properly.

With this in mind, we made a great contribution to the history of America. We found out that everybody could not live on a stream. Some of us had to live inside. So we went and built what are called privies. Today, under North Carolina state health regulations, privies are permitted but septic tanks are not in hard pan and soil clay today still.

He found out from that that he could dig a drainage ditch, and today you still carry that form, a drainage ditch, and I believe it is probably notified as a nitrification field. It is not a drainage ditch; it is a place to treat the sewage that you are disposing out there.

So from there, he found out that he could close it up and he could move it inside, and we came up with our septic tanks for today. From our septic tanks, we still have our nitrification fields even today, that we started years ago with, and our effluent is literally trapped in the rocks that you burn in the bottom of this nitrification field. This throws your water up so that it mixes with other water The ground does not absorb any water. The water runs free. It flows to its natural source. It only mixes with that water or diluting factor.

With the Jet system, on a home plant site, we treat this water in the tank, the same methods used by using your streams. We trap the solids and retain the solids. Then we put in aeration, the same thing that you are getting from here, the air. We put the air in and we stir it, the same effect you have got running down the stream.

Your septic goes in, on the septic tank side of it, and the approximate BOD goes about 200, 250, somewhere in that category. After it has set in and is settled in, it increases a little bit and goes into the 300 category, 350. On the Jet site, it comes in from the same side, but through aeration and treatment from the home system side of it, then we come out with a BOD from 30 to 50. You can see there is quite a reduction.

According to the Soil Conservation people in Brunswick County, we can take a hard pan or clay area and use evaporation, transportation and these type items to dispose of the water well. We come out with NSF-approved water. By the way, we are one of the six NSF-approved, and we are larger than all five of them put togehter.

With this in mind, we come out with a treated effluent. We can put chlorination to it. In some states they are using chlorination behind it and using the same water because it is definitely good fertilizer.

In Mississippi, the low-lying areas, they are using it extensively down there, which is about all they could put in. In the western part of North Carolina, you have got over 300 systems, according to the distributor over there, and they are taking it to the nearest lying stream and dumping this water. This water comes out with 86 or 87 percent removal. You can put on up-close filters and bring in 97, 98 or 96, in that category of treated effluent, treated water, so you come out with good, clean water. No, we do not meet the water qualification records with it yet because they are saying you have got to have it clean within 10 feet; we cannot quite do that.

But all we are doing is taking this water out of the Jet tank, putting it through some small gravel, small rocks, and in turn, every so often if you take the manual side, you go in and you rake these rocks, wash them with a water hose, and, lo and behold, you are ready to treat some more water well. You could put in an automatic system that automatically backwashes with it.

Now, when it backwashes, all it is doing is taking and washing these particles back off of the rocket trap. This is what your nitrification field is doing today. You get the torrential rains, you get the low water tables you have got around here, all you are doing is backwashing. So then you have got all of your effluents consolidated into one overflow going to your rivers and streams. So a home waste water treatment can eliminate a portion of what you are doing, and what we are going through today is this: Does the individual pay for it at his own home, does the Federal Government pay for it through tax dollars, or do we keep on polluting.

Thank you.

MR. ZELLER: That is all of the people that indicated they wanted to speak when they registered. Since we have had some discussion here, is there anyone here that has changed their mind and would like to make a statement? I think it is important that you do so.

Would you like to make a statement?

MR. FURGER: Yes, sir. Would you prefer that I be up there?

MR. ZELLER: Yes. Please come up and identify yourself

so I can get your name on the record. I want this on the record.

MR. FURGER: It might take me longer to walk up there and back than to make the statement.

MR. ZELLER: If you want to give me your question, then I will repeat it for the record.

Could you give me your name, please?

MR. FURGER: I am Jim Furger, F-u-r-g-e-r. I live in New Hanover County, and my remark was in the vein that this report, I did not ever receive the report. I want to and I want to read it. I think part of the report referred to groundwater runoff as being a special form of pollution of shellfish beds, fisheries beds, and having a bad effect on perhaps the groundwater later on, maybe having an effect on the reserves; is that right?

MR. ZELLER: You are talking about generally surface runoff?

MR. FURGER: Yes, surface runoff. So I think that most of the people here seem to be inclined or agree to the effect that many of the water site areas and barrier island areas are going to be extensively developed, which I agree that they probably will, but I think that it is incorrect, according to this report, to make all of your comments referring only to central sewage system plants when, in fact, your problems on barrier islands and problems where development is, there is concern over development in the areas along waterways and such as that, is that there are many forms of pollution. If you are going to worry about pollution, there are a lot of ways it is going to be polluted, and what it ultimately is going to boil down to is the density of development. There is more than one study that has been done that talks about the density of development on barrier islands and other places like that. Wildlife nuts like me have been talking about this sort of thing through the years and the problems that are in this report that we are talking about right now, these environmental extreme people have been talking to the rest of you for more than 20 or 25 years, and I think what you are going to have to face is that each local area, in order to preserve and have nice places around the streets and the houses and motels and condominiums, if you came down here just for a building, then you can go anywhere and get that, but the people who come here to live in the buildings that you build for them to live in came down here probably because there were not quite so many buildings to begin with. So my contention is that this study points really, if you think about the study, it points a lot further than sewage disposal. It points on down the road to the fact that people who live in these areas are going to have to force themselves to limit the number of buildings, the number of spaces for people to live in their communities.

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MR. ZELLER: Thank you. That is a very good point, and I guess one that all of us recognize that have been working professionally in this area for any number of years, that wherever you have the most people you have the most pollution problem, and I think you have correctly pointed out one of the most serious problems that we are facing in the country today that we generally record under the heading of nonpoint source pollution, but it involves those things that run off from the land, whether it be pesticides or fertilizer or bacteria that cause shellfish areas to be closed, or whatever the case. The nonpoint source of pollution is a very, very serious problem in the country right now, and drainage from agricultural lands and mining areas and a great many other problems like that are significant contributors to the overall problem and indeed need to be recognized. As we have increasingly built up, we have increasing problems. I think we all have to face those kinds of issues.

Is there anybody else who would like to make a statement at this point, or comment, or ask a question?

MR. BURNETT: I am Bill Burnett, with von Oesen Associates. What is the schedule from this point on?

MR. ZELLER: Let me ask Bo Crum to respond to that.

MR. CRUM: Okay. Bill, I think, as mentioned earlier, the comment period ends August 31, and just as soon as we can respond to the comments at public hearings and comments that we receive through the mail, we will put together a final EIS and getting that mailed out. As far as the schedule and that goes, I would estimate that surely by the end of the year, the end of this calendar year, we will have a final EIS published, or close to publication. It takes four to six weeks, once we get all comments in and put together, to file them and then we have to have it published and so forth, and that takes a while. But I would guess that by the end of the calendar year we should do that.

I want to point out, in case everyone does not realize it, that we will respond to each and every comment made by each speaker tonight and at the other two hearings, and also each comment received by mail. The public hearing transcript will be published in the EIS, as well as all the comment letters we receive, and each comment will be responded to.

MR. DENISON: Paul Denison here, and I would remind Mr. Crum when we started this exercise of drafting three years ago, we were going to have a draft EIS in less than nine months. I hope we will do better in maintaining this schedule.

MR. ZELLER: Mr. Denison, I am going to continue to remind Mr. Crum of the statement he made here tonight, and I assure you that the final EIS will be out before the first of the year.

MR. DENISON: To continue my question, I hope that I will not be considered out of order if I ask what is the

current cost of this study we are discussing?

MR. ZELLER: Of the EIS?

MR. DENISON: Yes.

MR. ZELLER: I simply do not know the answer to that.

MR. DENISON: Maybe Mr. Crum knows.

MR. CRUM: The cost at this point in time, and it will not increase any, is $545,000.

I see some people shaking their heads, and I would like to point out that that cost is not only the research that went into publishing the EIS, but it includes a number of tools that we mentioned earlier, and this is a natural resources data base, which we will be providing the computer tapes to the state agencies or anyone else who wants to use them. It includes a number of technical reference documents. There is a lot of good information concerning design and criteria for various types of systems, and so forth. I think probably the financial handbook and work sheets that we put together is part of that cost, which, I might add, was very well received at the workshops that we held up and down the coast a while back. I think some of you attended those workshops. We found that those responsible for financial planning for small communities were very interested in that, and I think it will be one of the tools that is well used. I think the groundwater predictive model and method for predicting the effect on groundwater level and on the groundwater quality will be a very useful tool. In fact, that is one area where no good hard data exists today, and it makes it difficult to assess the impact of these systems when you plan for wastewater management and, therefore, the development of that tool alone through the EIS process, which is included in that cost, will be a very significant tool in wastewater management planning in the future.

MR. ZELLER: The groundwater studies, I think, were a significant cost to this whole project. However, I think that was one of the most important areas, obviously, that had to be analyzed in order to determine what kind of an impact the septic tank systems have on water quality, and water quality impacts obviously the groundwater. This is the place we have to go to get answers to those kinds of questions and we need to have those questions answered. Anything you do relative to sampling of groundwater is costly, but as Mr. Crum mentioned we came up with some very important information that is goingto be applicable in many, many other areas of the country in assessing these same kinds of problems. It is very difficult to always come up with an answer and say for the dollars that you spend on scientific, technical engineering investigation, do you get a return for that. I cannot always answer those questions but as we continue to develop information in science and environmental engineering, we are much, much better able to do our jobs. We simply have to proceed

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in this vein.

MR. DENISON: Mr. Zeller, as a user of these tools, I heartily endorse what you and Mr. Crum have both said in that respect.. I think our only point is that this vehicle has been a difficult way to accomplish these tools, and then again, from our experience in the use of those modeling systems, we find that they are evolutionary and constantly changing, and I think that each step that we take is a step in the right direction, and we welcome those new options.

If I might, I would like to respond to your comments on the prioritizing and priority list. It was not clear in my first statement, but I think the point that I was trying to make was that a number of these communities that we are concerned with, coastal communities, were on the priority list at the time the decision was made to prepare the EIS. That, in fact, became an effective moratorium. They completely rearranged the state list, and these communities which were in pretty good shape at that time in getting a handle on the problem were denied that opportunity, and now are told to come back and get on the new list beginning in 1986.

One other point again that I think was not explicitly clear. We are talking about basic philosophical and technical differences of opinion in the use of subsurface disposal methods for wastewater effluent in the barrier islands systems. Of course, there is some other possibly more tried and true, and admittedly more expensive alternative, to remove those contaminants from the barrier islands themselves. A key point that we cannot accept is the insinuation in the EIS that it has been determined that the contamination of our shellfish waters in the sound area is a result of point source discharge from the mainland, ignoring the fact that the same situations do exist on the barrier islands. We are proliferating that problem head over heels in a fashion that you cannot believe until you get out there on those islands and look, and we are still talking about the reanalysis, the costly reanalysis of going back through an exercise to conclude again that we should either continue this process of subsurface disposal through septic tanks methods, the minor alteration thereof, or ultimately conclude to go back to a more simple system, whether it is regional or subregional, whatever it might be, to provide a more lasting and more viable solution. I think that really is the gut of our concern from a technical point of view, and certainly reflects the opinions of the boards and commissions that we are constantly meeting.

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MR. ZELLER: I appreciate that concern very much. Your point is very well make. Throughout the EIS process, in discussing strategy and the process of following the strategy, we have put forth certain options and alternatives we looked at. In some of the case studies that were utilized, it appeared to

be a significant cost saving and indicated an apparent better route to follow. As I indicated earlier, I do not think the EIS intends to propose any set system in any way. I think we are trying to address the issue of saying -- which I think we need to do much more of in our total environmental programs, is look at the problems on a case-by-case basis and there will be many circumstances, I am sure, where regional collection systems -- not necessarily regional collection systems, but collection systems and treatment systems are going to be the answer to the problem. There will be other instances when subsurface treatment will be the answer to the problem. I think we should feel free to go in and use the best possible combination for least cost to the user of these systems, to the government and to everyone concerned, if we can meet those same objectives in maintaining water quality, and that is what we hope to do in the process of developing this document. I think it is helpful in that regard, and will be useful in that regard.

Again, I appreciate your comments. I understand exactly what you are saying. They are well taken, and I think we should try, Mr. Crum, in our response in the final EIS, I think we should address that priority list issue in some detail, and get back and clear the air of that issue. I am not prepared to do that at this time, but I think we should do that in the final EIS, and we will.

MR. ZELLER: Is there anyone else who wishes to speak?

MR. CLARK: Question of information in the water quality statement, the only exception that has been documented is problems in several different houses. Any of those in my particular area?

MR. CRUM: As I recall, in an area adjacent to Ocean Isle Beach was the one area, I believe, in Brunswick County that was a documented case.

MR. CLARK: Any monitoring of those now?

MR. CRUM: Ongoing at the present time? Not that I -- well, excuse me. The shellfish sanitation people that operate out of Beaufort peridically monitor all those areas. In fact, it is their determination which decides whether an area is to be open or closed, so they do take samples for choliform bacteria.

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MR. CLARK: That is not practical for a private person to monitor?

MR. ZELLER: Really what we are talking about is monitoring for bacteria, largely for water quality, and that requires a special facility for culturing organisms and counting those organisms to determine the number that will be involved.

MR. CLARK: Is that done by Public Health?

MR. ZELLER: Yes.

MR. DENISON: Mr. Zeller, because there is an interest, we are in the process right now of establishing a monitoring

program in the area described by Mr. Crum as a cooperative effort between local interests and the Division of Environmental Management. We hope to have that program on the line in the next 30 to 45 days.

MR. ZELLER: I am pleased to know that. That is very good.

MR. CRUM: Very good. That data will be useful.

MR. ZELLER: Anybody else?

Again, our purpose for coming here and meeting with you is to try to answer your questions and clarify all the issues anybody wants to raise.

MR. VAUGHAN: I ought to keep my mouth shut because it is philosophical, but if nobody else is going to ask any more questions, I would sort of like to go. I am not much of a poet, but some poet said, "What fools we mortals be," did he not?

MR. ZELLER: Some poet did, yes, sir.

MR. VAUGHAN: Obviously what you people are dealing with is people pollution. Have you made any studies as to whether or not in Brunswick County the population on the beaches and the sound continues to accelerate at the present rate? Say by the year 2000 will pollution have reached the point where everything will be so nasty that nobody will want to come here anyway? Are there any studies of that kind?

MR. ZELLER: I do not know of any specific studies of that type that have been made. Again, your point is well made and I appreciate and understand what you are saying. I think we intend to address these kinds of problems on the development of adequate waste treatment systems. That is the only way in the world we are ever going to survive as we increase in population and we, of course, continue to do that.

We talked about a system here tonight of strategies that would be responsive to increases in population. I do not know that anybody has at this point in time made any specific studies to project what kinds of environmental impact we might expect in Brunswick County by the year 2000 in anything other than a general sense. Mr. Denison, maybe you know of some studies that I do not know of.

MR. VAUGHAN: So the poet was all right when he said, "What fools we mortals be"?

MR. ZELLER: He was not all wrong, no, sir.

Could I have your name for the record?

MR. VAUGHAN: M. H. Vaughan, V-a-u-g-h-a-n.

MR. ZELLER: Thank you, Mr. Vaughan.

MR. DENISON: I think Mr. Shakespeare was more known for writing than poetry, but Mike's point is well taken.

In answer to your question on case studies, there is the coast of New Jersey. In answer to Mike's point, people still go there by the millions.

MR. ZELLER: Yes, sir? Let me have your name again for the record, please.

MR. FURGER: Jim Furger. I guess this is more of a philosophical question, too. As the gentleman pointed out -- Mr. Denison -- in the case of New Jersey, the people are still coming to New Jersey. But what are they coming there for, if they are still coming? Isn't it gambling?

[Laughter.]

MR. ZELLER: I think we have about covered the material. Thank you. Thank you all very much. This has been a small meeting, but I think a good meeting, and I appreciate your being here and the comments you have made. Hopefully, this has been worth your time. It certainly has been worth my time in hearing what you have to say, and I appreciate your turning out.

Let me make a few statements for the record to formally close this out. As Mr. Crum indicated earlier, the hearing record will remain open until August 31. If anybody here would like to provide a written comment during that period, please do so. We will accept any written comments. They should be sent to Mr. E. T. Heinen, whose name and address appears at the bottom of the Agenda that was given to you when you came in. So if you have any written comments, send them to Mr. Heinen at that address.

Again I want to thank you all for being here, and we appreciate your comments. EPA is committed to assisting local governments in resolving public health and water quality problems in a cost-effective way, and your comments are going to help us meet that goal.

All of the words that were spoken tonight will be put into the transcript and responded to in the final EIS, and it will be the final decision in the summary of the draft EIS and any pertinent additional information or evaluation developed since publication of the draft, comments received and EPA responses. A transcript of this hearing will also be included.

Those of you who commented tonight or who submit written comments will receive a copy of the final EIS. That is one of the reasons why we wanted you to register.

Thank you again for being here. We will be here for a little while and would be pleased to talk to you if you would like to do so after we adjourn the meeting.

No other information coming forth for the record, I am going to close the hearing.

(The public hearing in the
above-entitled matter was
adjourned at 9:15 P.M.)

NORTH CAROLINA BARRIER ISLANDS
DRAFT ENVIRONMENTAL IMPACT STATEMENT
PUBLIC HEARING

HELD AT

NORTH CAROLINA MARINE RESOURCES CENTER
BOGUE BANKS
PINE KNOLL SHORES, NORTH CAROLINA
AUGUST 24, 1983
8:00 P. M.

PRESIDING:

MR. HOWARD ZELLER
and
MR. BOWMAN CRUM

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The hearing was called to order at 8:10 P. M.

Mr. ZELLER: It's a little after eight o'clock, so I would like to go ahead and open the public hearing. If any other individuals come in late, they can register and become a part of the hearing as we move along. First of all, I want to welcome you to this public hearing tonight. We are very pleased to have you here, and receive your comments on the Draft Environmental Impact Statement, which addresses wastewater management for the North Carolina barrier islands. My name is Howard Zeller, and I am the Assistant Regional Administrator with the Southeastern Region of the United States Environmental Protection Agency. My office is in Atlanta, Georgia. With me is Mr. Bowman Crum, who is the project officer for this EIS. I would also like to introduce Doctor Claude Terry, who is at the registration table. Dr. Terry was our consultant, who was involved in the preparation of the Environmental Impact Statement. The purpose of this evening's hearing is to receive public and other agencies comments on the draft environmental impact statement for the North Carolina barrier islands. The EIS that we are talking about provides guidance and procedures for local governments and their contractors to assist in planning the wastewater facilities. Preparation of the facilities plan is the first step in the EPA's three step construction grants program for wastewater management.

To be eligible for Federal funding, proposed facilities must be part of an approved facilities plan. The facilities plan must identify the least costly means of resolving public health and water quality problems resulting from improperly treated sanitary wastewater. Steps two and three of the construction grants program will offer design and construction respectively. These steps, of course, follow completion and approval of a facilities plan. Only one of the Draft 201 Facilities Plans for North Carolina barrier islands has proposed a construction of extensive wastewater collection, transportation and treatment facility to serve large portions of these islands. After an environmental review of the proposed facilities, EPA has significant concern about the potential impacts, and the cost of these facilities. The National Environmental Policy Act, or NEPA, requires Federal agencies to prepare an Environmental Impact Statement on major Federal actions that significantly effect the quality of the human environment. Because of the environmental complexities and the water quality issues that have been involved in these projects on the barrier islands, EPA made a decision to prepare an Environmental Impact Statement. In September of 1980, the notice of intent to prepare an EIS was issued, and this public hearing tonight is being held to receive comments on the Draft Environmental Impact Statement. EPA, as always, wishes to encourage public participation in the Federal decision making process, and to develop improved public understanding of Federally funded projects. Draft EIS was made available to the public in EPA's office of Public Activities, on July 11th, 1983, listed in the Federal Register on July 15th, 1983. The comment period on the Draft EIS will extend until August 31st, 1983. Comments received this evening and during the comment period, will become a part of the official record of this Environmental Impact Statement, and all of the questions that are raised here tonight will become a part of the final Environmental Impact Statement when it is issued three or four months from now. Before I receive testimony from the floor, we have an indication that quite a number of people wish to testify tonight, I'm going to ask Mr. Crum if he will provide us with a summary of the pertinent issues in the Environmental Impact Statement. If you would do that, Mr. Crum, I would appreciate it.

MR. CRUM: This Draft Environmental Impact Statement, or EIS, has been prepared in response to issues raised during the review of five draft 201 facilities plans. These plans proposed the construction of wastewater collection, transportation, and treatment facilities to serve large portions of North Carolina's barrier islands. Through the EIS process, wastewater management alternatives for the barrier islands were developed and evaluated and a strategy is

proposed. The review of these draft 201 plans and the scoping process for the EIS, identified six basic issues to be addressed. The issues and the major conclusions of the EIS are as follows:

Issue number one - WATER QUALITY- It is important to identify existing water quality problems in order to determine the need for additional wastewater facilities. The draft 201 plans pointed to septic tanks on barrier islands as the reason for closed shellfishing waters. The data reviewed through the EIS process do not confirm this conclusion. Surface runoff from the mainland appears to be the cause of the closings except in a few isolated cases.

ALTERNATIVE WASTEWATER TECHNIQUES- Issue number two. The draft 201 plans do not fully evaluate on site and community system technologies for wastewater management on barrier islands. The EIS has found that these systems may provide more cost effective solutions to solve existing water quality and public health problems, while providing for desired development. The EIS proposes additional site specific analyses of these alternatives.

Number three - FINANCIAL IMPACT ON LOCAL GOVERNMENTS - Providing wastewater treatment is a major financial undertaking for a community and its residents. The financial and management implications to the local governments and the system users can be significant. The draft 201 plans do not demonstrate the financial and institutional capability of these communities to support the proposed system. The EIS provides guidance for local governments to evaluate and resolve these potentially severe impacts.

Number four - NONPOINT SOURCE POLLUTION - Shellfishing waters have been closed where sewer systems exist in coastal areas of the Southeast. Studies have shown many of these closures to result from nonpoint runoff. New wastewater facilities may promote higher density development, thus increasing the potential for nonpoint source pollution of estuarine waters.

Issue number five - GROUNDWATER - The potential impact on groundwater hydrology and goundwater quality is a mjaor issue when considering soil absorption wastewater systems. Although few of the barrier island communities use the surficial acquifer for water supply, the effects of any proposed system on groundwater should be carefully considered. The EIS proposes a method for determining the water table response to soil absorption disposal of wastewater. The EIS also recommends collection of data in certain instances. EPA has initiated a study which will demonstrate this water table response method, and will collect groundwater quality data for three locations on the North Carolina barrier islands. The information from this study, along with the method developed by the EIS, should significantly improve

the ability to predict the impacts on groundwater from soil absorption disposal. Results from this study should be available by the end of next year.

Issue number six - SENSITIVE NATURAL AREAS -The primary and secondary impacts of wastewater facilities on sensitive areas such as dunes, wetlands and estuarine waters, should be considered in planning for wastewater facilities.
The EIS process included several steps. First, an inventory of existing conditions was prepared. Next, alternative wastewater management strategies were developed. Third, the strategies were evaluated, aided by using a case study. Finally, this entire process was summarized and published in the draft EIS.

I would now like to summarize the strategies addressed by the EIS. They include: The proposed EIS strategy, the 201 strategy and the no Federal action strategy.

A special strategy is developed in this EIS. This approach is intended to provide assistance to local governments in planning for wastewater management. The approach encourages communities involved in facilities planning to update and revise their draft 201 plans, as appropriate, using special procedures developed by this EIS. The procedures developed by this EIS refine those normally undertaken in the preparation of a 201 plan. The procedures are consistent with 201 construction grants regulations and other facilities plan preparation guidance, and are tailored to address the unique evnironmental and socio-economic conditions on the North Carolina barrier islands. The procedures are designed to address the six issues identified earlier. Special attention is given to two areas: One, a thorough evaluation of potentially reasonable wastewater technologies, especially on-site and small community systems, and two, the financial and institutional impacts of operating and maintaining wastewater management systems.

The procedures fall into three major groupings: First, determining need and estimating flows, then developing alternative wastewater management systems, and finally, evaluating these alternative systems.

An overview of these procedures, which is Figure 11.1 in the draft EIS, is included in the handout you received tonight. The procedures are described in detail in the draft EIS, and the alternatives development technical reference document.

The EIS has compiled informatin and developed tools which will be helpful to those planning for wastewater management. These tools include a computerized data base of natural resource information, details on wastewater management options, on-site wastewater treatment and disposal system siting criteria, a financial planning handbook, with worksheets, and a predictive groundwater model. These

procedures and tools are designed to allow identification of all viable alternative systems, and to promote consideration of the major potential impacts on both the man-made and the natural environments.

The EIS compared the proposed strategy to the alternatives of no action or no Federal action strategy, and of approving the draft 201 plans as sumitted or the 201 strategy. The no Federal action strategy would be a decisio by EPA not to participate in the further planning or funding of wastewater management facilities in the study area. The analysis of this strategy concludes that there would be continued growth on the barrier islands, regardless of whether publicly-owned and funded facilities are constructed. Without additional EPA assistance, existing wastewater management practices are likely to continue. Localized state regulations would govern the use of soil absorption systems. Individual property owners would be responsible for providing adequate treatment and would bear the cost of renovating failing systems or installing new facilities.

The 201 strategy would be the approval and implementation of the draft plans without significant changes. The plans would have to be updated in certain areas such as costs. Those plans proposing ocean outfalls, the Dare County and Carteret County plan, would have to incorporate the results of site-specific outfall surveys. The Carteret

County plan for the barrier islands would have to be modified, since one of the two communities involved elected not to participate.

One of the six plans, Hatteras Island, proposes no action, because it was determined that a system is not economically feasible at this time. The other five plans exhibit several similarities. Each plan calls for the replacement of existing on-site wastewater systems with centralized collection, transmission, treatment, and disposal systems. These plans justified the need for facilities based on the belief that shellfishing harvest area closings were caused by existing on-site systems. The plans also projected additional shellfish area closings, with continued residential and commercial developments, using on-site systems.

Another similarity is the proposal to provide sewer lines to most areas of these communities. Pumping stations and force mains are to be used in all facilities to transport effluent to the treatment plant. Secondary treatment is proposed for each facility. Ocean disposal is proposed in Dare and Carteret counties, spray disposal in Topsail/Surf City and Southwestern Brunswick county, and surface water discharge to the Cape Fear River in Southeastern Brunswick County.

The EIS developed strategy is proposed as a means of

assisting local communities in finding a cost effective and affordable means of providing wastewater management. The approach is designed to allow maximum flexibility for local governments to accommodate desired growth.

The EIS concludes that the 201 strategy could result in costly systems which could produce adverse secondary impacts to local governments, and to environments. The no Federal action strategy would leave certain water quality problems unresolved, and could increase the probability of future problems. No Federal action would likely eliminate the continuation of facilities planning.

The EIS strategy incorporates the following beneficial features:

The procedures promote documenting and then resolving water quality problems.

The procedures provide flexibility for meeting existing and future wastewater management needs.

The procedures promote maximum local decision making, and provide for disclosure of financial and institutional impacts.

The procedures minimize costs to communities by promoting consideratin of less expensive alternatives. The construction grants program has been delegated to the State of North Carolina. Any future wastewater management projects will have to meet State requirements. To receive funding, any project must be eligible for funding based on its position on the State priority list. Also, any project to be funded must meet the construction grant regulations applicable at the time of funding.

I look forward to receiving your comments. Suggestions for improving the methods proposed in this EIS for wastewater management planning are most welcome. Mr. Zeller.

MR. ZELLER: Thank you Mr. Crum. Now, I would like to move on with the real purpose of this hearing, to receive comments from the public, and we will do so immediately. Before we do, I would just like to make sure that all of you here have registered at the desk. We would like to have a record of the hearing attendance, and importantly, we can also then provide you with information from our mailing list. So, if you have not already registered at the desk, please do so. Quite a number of people have indicated they wish to speak to night, so I'm going to ask them to the extent that you can, to be brief in your comments, and if you would like to summarize your comments, then provide official comments for the record, that will be fine. On the other hand, I am very concerned about seeing that everyone gets on the record that is interested in having information on the record, so I'll see that we have enough time to do that. Let me start off then by calling our first speaker then, and ask him to come up to the podium, and to identify himself for the

record. The first speaker is Mr. Craig Cogger, who is Research Associate at the North Carolina State University in the Soil Science Department. Mr. Cogger, would you come forward please. We are pleased to have your comments.

MR. COGGER: I'll summarize some written comments which I have made. I think, in general, the environmental impact statement was thorough and informative and well done, and I think that the recommended strategy, using on-site systems with small community systems in some of the more sensitive or high-in-density areas is probably the best overall strategy. I feel that several of the assumptions and conclusions made should be re-examined to make this EIS a better assessment of the monetary, health and environmental costs of waste treatment on the barrier islands. I will summarize a few of the specific comments.

The first deals with the separation of the water table. Our State rules right now require a one foot separation from the bottom of the absorption trenches in your septic drain fields to the seasonally high water table. We've been involved with some research on the barrier islands, and from our data, we have concluded that you really get a lot better treatment if you have a two foot separation in those sandy soils between the bottom of the trenches and seasonally high water table. I think that this additional separation is important in getting good treatment with

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on-site systems, and I recommend that this idea be con-
sidered in this EIS for on-site systems. I think the EIS
pointed out that in most of the coastal areas, you do have
a great majority of the land, you are going to be able to 15
put in systems that will meet that criteria. So this is
not something that is going to take a lot of land out of
development for on-site systems.

I have a few comments about costs that were in the EIS.
I'll just mention a couple of these. Maintenance and manage-
ment were mentioned in there, especially when we start
talking about these alternative systems, like low pressure
pipe and the mound system, which are going to be needed on
some of your marginal soil where you may be using on-site
systems. And the only cost figures I saw was about a
twenty dollar a year for pump maintenance, and I think you're
going to find that the rate of pump or control failure 16
problems that we have seen, that it is going to take more
than an average of twenty dollars a year to be maintaining
those things. And there is also a whole question about
management of the systems, where you have a lot of these
alternative systems, a lot of little pumps cranking away
and technology which is not perfect yet, we're going to need 17
a pretty good management program to make sure they are
working properly and to get good water quality. And I think,
well, I don't think, I know, it's going to cost money to do

that. That money is going to have to come from somewhere.
I don't know if it's appropriate to be included in this EIS, 17
but I think that those are some costs that are going to have
to be considered. Another thing is, EIS assumes in some
areas we are going to degrade the quality of our surface
unconfined water acquifer. It points out that in a lot of
places local people get their water from deeper wells.
A lot of times on a community basis. However, there still 18
are a number of people who use shallow wells for their
ground water. If they are in an area where it gets degraded,
if that's what happens, who pays the costs, once their wells
are contaminated, for hookups to one of these other, whether
it is deep well or off-island systems. That's another cost
that would have to be included.

I move now to density of developments. This is a hot
issue in North Carolina. It is mentioned several times in
the EIS. The first thing I'll cover is the effect of
on-site systems on the density of development. The EIS
correctly states that where we have on-site or small com-
munity systems, we're going to have lower density develop-
ments, and fewer problems that come with high density
development than we will if we have some large community
system, but I think people can see, driving up and down
Bogue Banks here, we can have pretty high density develop- 19
ments with on-site systems. I believe that the current

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density requirements that we have may allow serious pollution of the shallow acquifer, and I'm not entirely convinced that our surface waters or estuarine waters are going to be safe in these situations either. It's difficult, where we do have some of this high density going on. An approach that might be taken, is to designate some areas like large parts of the Bogue Banks, as high density areas even with the on-site systems, and we say, if the people are willing, we're going to take our lumps with the shallow ground water, and we're going to lose it. There's not many people drinking it anyway, and see what happens to the surface waters, maybe take our lumps there, but designate other areas that are going to be at much lower densitiy than what

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is currently allowed. One thing that concerned me in this EIS about the density of development was there was a statement that some of these off-island waste treatment systems, where we after the secondary treatment, we apply it on waste land by spray irrigation. It seems to me that it said you get higher loading rates than you would on on-site systems on the barrier islands, and there was a greater possibility of ground water contamination beneath these spray irrigations fields. Well, the way things are currently done in North Carolina, if you have a spray irrigation field, you have to take into account how much nitrogen and everything else you are adding to that land, and determine

what's the limiting factor inside your field, based on that. For some surfaces all you worry about is water. You don't worry about nitrogen or anything else that might be there. If it is sandy soil that will allow a lot of water to be applied, you can get a much higher loading rate with a subsurface system than you can with a spray irrigation system. Where we have some of this high density development, you are having a pretty good size sub-surface system and loading a large amount of effluent onto one area. We may not have documented yet some of the problems with this. The pollutants move very slowly through the ground water in these areas, but I think that we may have some real problems with this high density development in the future.

I guess one final thing I'll talk about is the pollution potential of the on-site systems. In the EIS it states there is a few cases of pollution by on-site systems on the barrier islands that have been documented. It notes problems with a few isolated finger canal areas. What I would have like to have seen was if there were some finger canal areas that had been looked at and had been given clean bills of health, that we would have known, that look, a lot of these there aren't any problems with them. But I have a feeling that maybe there is a few isolated areas, because we really have few isolated studies so far. We did some work, which we have just published in a parenthetica form really, looking at a couple of finger canal areas in this county up in Atlantic Beach. One was developed house trailers, seasonal occupancy for the most part. The other was undeveloped, and we found substantially higher levels of ammonium, nitrogen and fecal coliform bacteria in the ground water beneath the developed one. It was, I think about eight parts per million ammonium, on the average. The fecal coliform levels were running about, on the average, over all our wells overall time, about a hundred, which is not really high, but for waters to get directly into the shellfishing waters, it is above the shellfishing limits.

I'll just conclude now, as I stated to begin with, I think the environmental impact statement is basically well done, and I think its thrust is heading in the right direction, but I think it may fall short in assessing a cost of the maintenance and management of the on-site strategy, and in evaluating the pollution potential of some of the systems. If the proper management and maintenance are not carried out, and we don't have the money to do that or the people here don't realize they are going to have to spend this money and balk at it, I think the pollution of the shallow ground waters and even the surface waters will become an ever-increasing problem as the density of development continues to increase in many areas. Thank you.

MR. ZELLER: Thank you. Very good comments. I appreciate

your taking your time to be here. I will comment back to you on a couple of issues. Let me assure you that the density of development is not just a hot issue in North Carolina. It is a hot issue everywhere in the United States as far as I know. It is a very important issue, and one that we certainly can't over look. I wanted to ask you relative to the finger canal water quality studies you mentioned where you found higher fecal coliform levels and higher ammonium nitrogen levels, was this an area that had been filled?

MR. COGGER: Right. These were filled areas, right.

MR. ZELLER: This is typical of what we would expect, and some of the kinds of water quality problems we have identified with finger-fill canals many years ago, when we were looking at the development of these dead end canals and assessing, not only the impact of septic tanks, but also the water quality many times in dead end canals and low disolved oxygen . . . (Interrupted by Mr. Cogger).

MR. COGGER: This was a test of ground water, you know beneath, I don't know if you want to call it ground water or not, but whatever it was beneath the fill areas there.

MR. ZELLER: I think a couple of other key points that you identified, one of which was relative to maintenance and management of some of these small systems that are in place. I looked at a number of those, and have been looking at a number of those in the last several days. They appear to be good operating systems, doing what they are supposed to be doing, but obviously, they are also very well managed. And with any package treatment plant which is not well managed, it is simply not going to do the job, and that's absolutely imperative in terms of the strategy that we have to have proper maintenance and management of these facilities, and you may be right. Maybe those costs are not high enough, but that's extremely important. And one final point as a matter of information, we share your concern on ground water, and we have invested some sizeable dollars into some ground water studies and monitoring of ground water. I think that's a factor that we have to know in terms of these systems, is what kind of impacts, if any, are we finding on ground water, and we will have the parts of that puzzle in a few months, and be able to respond to it appropriately.

MR. COGGER: I'll be interested in seeing that. A final comment on this maintenance and management; I was thinking as well on the individual on-site system, just for the individual home owner, when we get into these low pressure and mound systems, we're finding, we've done a lot of work on them at N. C. State, and we're going back now and starting to dig some of them up and see what's been going on over the years, we're monitoring the pumps, how many cycles they are

pumping and things, and it looks like, at least in some areas, there may be need for more maintenance than we had originally thought. We really don't know too much what's going on yet, but I think that's going to be an important thing, to keep them working.

MR. ZELLER: It's very important. It's very important in any waste treatment system. We were discussing a recent study that was conducted relative to all of the waste treatment systems that have been constructed in this country with construction grants. I don't know how many billions of dollars would be involved in construction of these facilities, and unfortunately, over eighty percent of these facilities are not being operated properly, and that's a very critical factor. You know, it has to come to bear, and obviously this kind of system, as with any system, we have management and maintenance to be considered. Thank you.

MR. COGGER: Thank you.

MR. ZELLER: Let me acknowledge Mr. Jim Stewart, who is county commissioner in Onslow County, who came in late. We are glad to have you Mr. Stewart.

MR. STEWART: I'm glad to be here. Thank you.

MR. ZELLER: The next speaker I have is Ms. Kathy Gallveci from the Sierra Club. Ms. Gallveci, will you come forward please.

MS. GALLVECI: Good evening. I would like to present a rather brief statement on behalf of the North Carolina chapter of the Sierra Club. The Sierra Club commends the United States Environmental Protection Agency and the consulting agencies that have prepared a draft environmental impact statement on North Carolina barrier islands wastewater management. DEIS is a thorough and balanced examination of the subject. We believe the EIS strategy is the preferred one of the three presented, because it allows for continued study of water quality problems and their sources, promotes sound and flexible planning for future needs, and to minimize the cost to local communities. However, because the EIS strategy is more open ended than the others, there are several concerns that need to be studied in depth should the EIS strategy become the adopted approach.

Number one. The need for intensive study of the average primary and secondary environmental impact of ocean outfalls, should they be a component of the revised 201 plan.

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Number two. The possible loss of wastewater management constraints due to construction of community and/or regional systems, must not encourage and promote environmentally unwise and high density development that would aggravate nonpoint source pollution.

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Number three. Assuming on-site systems will be the

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preferred option in some locations, the deleterious effects on ground water, and the absorbative capacity of the soil must be regularly monitored, to identify and correct problems before they have a wide environmental or public health impact. We appreciate the opportunity to review the draft environmental impact statement, and to express these concerns. Thank you.

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MR. ZELLER: Thank you very much. We appreciate your comments. As indicated earlier, we will respond to all of these issues in the final EIS when it is promulgated, and you raised some good points, and we appreciate your coming here tonight. The next speaker I have is Ms. Flora R. Garrett. Ms. Garrett is from Pine Knoll Shores. It's good to have you here.

MS. GARRETT: I wasn't sure whether I was going to speak tonight or not. I'm a new resident of two months in this area of Pine Knoll Shores, but I am past chairman of a water and sewer authority in Orange County, North Carolina, and a past county commissioner, so I am concerned about waste water treatment. What I would like to say is, having reviewed your document, I think your draft EIS approach is the way to go, and I think the problem that the State and the counties in North Carolina have had with over-crowded trailer parks, large developments in rural areas, has been because there has been no maintenance and management of

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the package plan small septic tanks. The plan and the approaches that you suggest mean that the communities here on the barrier islands need to get together, either with the County Health Department or with themselves, and come up with a team that could monitor past ordinances, as necessary, and, of course, this costs money, but it's inovative, and a direct approach, and I hope that's what we do.

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MR. ZELLER: Well, I hope so too. Thank you very much, and we appreciate the benefit of your experience. As I indicated earlier, I totally agree with your approach. I think that's very proper. Thank you for your statement.

Next, let me ask Mr. David Harris, who is the City Manager of the town of Morehead City. Mr. Harris.

MR. HARRIS: I have no comments.

MR. ZELLER: I see. I had your card placed in the wrong location. It shows that you did not indicate to speak, and I indicated that you wanted to speak. Excuse my error. Mr. Todd Miller, who is President of the North Carolina Coastal Federation. Mr. Miller.

MR. MILLER: My name is Todd Miller, and I am President of the North Carolina Coastal Federation. The Federation serves as a clearing house for twenty-six groups throughout North Carolina, who are concerned about coastal issues. I'll be encouraging each of these groups to send written comments on this draft, and also providng you with more

addresses, so that a greater number of people can learn about these meetints. The comments that I have tonight are my own comments, and are not meant to represent these different groups. I am a native of Carteret County. I think it is important, and it has been brought out through this draft, that the nature of these islands are very different than other types of communities that traditionally receive EPA funding for wastwater projects. Most of the residents are part time. If you drove down tonight, you would notice that many of these houses are already empty, and we are still in August. These are investment properties, and most of the properties are high income, and on top of that, the dynamic nature of the islands. We have a storm brewing right now, and the fact that these systems are susceptible to major damage would also increase the amount of Federal money that through disaster relief, that would go into maintaining the systems. These are not your typical communities that are in desperate need of Federal help. One example of this is a private sewer plant that is going up on West Onslow Beach, just South of here, without Federal assistance. I would like to commend the EPA for its draft, and in addition to continuing to investigate on-site sewage treatment in small community systems, I think it is important for you to consider the equity question of whether tax dollars should be spent on systems for communities of this

nature. Also, the problems of non-water pollution should be
clearly spelled out. One of the biggest problems with the
commercial fishing industry in the State is fresh water,
and the peak flows of fresh water as they come off offering 27
pollution. Nine out of ten of the commercial species in the
State can have their reproductive cycles interrupted by
fresh water. The fact that current pollution problems cannot
be documented, and that EPA funds are not meant to accommodate
growth with funding wastewater treatment plants, is
another factor that it's good to, you know, document, that
this has come out the way it has. My recommendations are
that you improve, or offer recommendations for improving
State regulations for on-site sewage treatment systems, and
that EPA put money into maintaining, monitoring and regu- 28
lating programs to assure that on-site and community systems
are operated correctly. Thank you.

MR. ZELLER: Thank you very much. We'll be very happy to receive written comments from the other groups that are involved in the Federation. I hope you will encourage them to give us their comments. I think it is important that we have that kind of information for our records.

MR. MILLER: I've been making a number of calls today, and a majority of your typical citizens was not aware that this meeting was going on. I don't know how you go about it, but I think there is a need to get broader public awareness of

what you are doing here.

MR. ZELLER: That's always a concern of ours. We're concerned about our public notification process. We try to get out adequate notice. We try to develop mailing lists and put things in the paper, but invariably somebody always misses the information. We need to continue to do everything we can to get the word out. I'll agree with that. Now, let me ask Mr. Steve Steinbeck, Superintendent of On-Site Sewage Treatment Program for the North Carolina Division of Health Services. Mr. Steinbeck, glad to have you with us tonight.

MR. STEINBECK: Thank you Mr. Zeller. My name is Steve Steinbeck. I'm with the North Carolina Division of Health Services, Environmental Health Section, Sanitation Branch, and with all those titles, you might recognize that we probably have several programs which are directly impacted by the environmental impact statement, and particularly, the recommended strategy, public water supplies, shellfish sanitation and on-site sewage management, which also includes the disposal of septeic or sludge.

First of all, I would like to say that I appreciate the opportunity to be here tonight to speak regarding the EIS. I think it is unfortunate that there are not others here. Some of us have been at previous meetings, and we have known the hours of meetings and the uncountable hours of the consultants for the EPA and the EPA staff themselves have put into it. Our staff has devoted just a small token amount of time to it, and I think the end product is to be commended. I know the stress, some of the stress that the EIS and the volume of publications that were put together, and I appreciate the decision, the tough decision that was made by the Region IV EPA, because we have seen this past winter, the impact of development along our estaurine shore lines of North Crolina, which was manifested in the closure, for the first time in history, of all the shellfishing waters in North Carolina. I predict that it will happen again and again, until ultimately you will see the shellfishing program in North Carolina become something of history.

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I think there is also a real possibility of forgetting the water supply, the very fragile water supply, which is apparent right now on our barrier islands. Yes, we have seen communities up and down our barrier islands go to off-site, if you will, water supplies. We've seen them go to community wells. We've seen them pump water many, many miles so that they no longer have to drink tainted water coming from that shallow, unconfined acquifer present throughout the barrier island chain. One may say we are on a tight schedule.

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Having spent recently a substantial amount of time along the barrier islands, I can say that density, and you can underline that a thousand times, density

is the issue, regardless of whether you go on-site or off-site, spray irrigation whatever wastewater management concept is looked at, density is going to be the thing that is going to degrade our natural resources. We've seen it consistently. Septic tanks are not the whipping boy that everybody thought they were. I think part of the EIS study proved that. However, we do recognize that there is a cenogenestic effect, and it could become--as you drove down here this evening, you see the condominiums. I can tell you that every condominium, every cottage you passed, every business you passed had a sub-surface system. That sewage was not disappearing. It doesn't go out of sight and out mind. And we must recognize that we have got to get it out of sight and out of mind with treatment, and we must follow that treatment with management, and we must follow that management with long range planning, because even with the best management, we are going to have long term problems related to on-site community, small, wastewater treatment disposal systems. With that in mind, I would recommend to the staff of the EPA and their consultant, to review and hopefully incorporate as a final publication, the Rural Aids Project Handbook. This particular handbook was published by EPA Region V in Chicago. EPA, Region V has recently gone through a very similar process that is taking place right now. So I would suggest that this handbook be carefully reviewed, and to see if it cannot be modified and used as a general user publication. Having spent several hours myself, going through the four publications that were submitted, it would be very nice to look at a little brief executive summary, and then get some concepts in a publication such as the Rural Aids Project Handbook, so I recommend that. We will have formal written comments at a later date.

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And again, I am speaking specifically for the Sanitation Branch, the Shellfish Sanitation Program and the On-site Sewage Program. Bob Denton is in New Orleans, and could not be here this evening.

In conclusion, I must say that North Carolina, the EPA qualitary associates and their other consultants should be commended for a thorough, comprehensive environmental impact statement and recommended strategy. I feel very strongly that it is the right direction to go, and I'm speaking for our Division on that. We do support the EIS strategy, and it's one that becomes--it's a difficult situation for us to actually say that we do support it. On the other hand, we look at our shellfish resource, and on the other hand, I, as a program supervisor, look at our problems related to on-site sewage. So it would be very easy for me to say put in the regional sewers and pump it to the mainland or go to the ocean outfalls, but I think we have to do a careful balance. We are doing that now, and I think with continued management

I'm not talking about statement; I'm talking about local and regional management, will this work. Thank you.

MR. ZELLER: Thank you very much. We appreciate your comments. They are particularly meaningful as far as this hearing is concerned, because of your extensive experience in this area. Let me ask you a question for the record here. I recall the closure of shellfish beds that occurred, and my recollection is that that was primarily due to nonpoint source. Is that correct? Is that a correct statement?

MR. STEINBECK: Yes. I think, of course, this particular winter we had an excessive amount, an unusually high rainfall, and we had, corollary to that, freshwater intrusion from runoff, septic tanks systems, an unusually high number of malfunction of septeic tank systems, and other pollutants just running off from paved areas and other surfaces. All this was created and essentially manifested itself from the excessive rainfall, which was probably a fifty year event for us in North Carolina.

MR. ZELLER: Thank you. Let me next ask Mr. John Melvin from Greenville, North Carolina, to come forward.

MR. JOHN MELVIN: I'll have to ask you for forgiveness. I really had no information on time or didn't know I was supposed to make a kind of formal statement, so what I'm going to say is just kind of off-the-cuff, and if it's a little bit incoherent, just bear with me. I'll try to get to my point.

MR. ZELLER: That's perfectly appropriate. We don't require any formalities. We're here for comments and information. We're very glad you took the time to be here.

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MR. MELVIN: My main point in all of this, and I haven't read through all the proposed strategies, but I think you probably noticed that the general tenor is that large centralized systems maybe are not the best way to do, especially down here, and that is the point I would like to emphasize. I really can see no benefit whatsoever. The present systems that are here provide fair share treatment. They are well-managed and maintained. The data that comes from them and

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from monitoring wells substantiates this.They, due to the design nature of the individual systems, have a limiting effect upon density, because as each developer will tell you as he hollers and screams after going to Raleigh or wherever to find out how many square feet he's got to have. There are some limits with large centralized collection systems. I envision almost brick to brick walls, solid up and down.

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There has been some comment about the management of the various facilities, and I was in the middle of talking to someone. However, I thought I caught the tail end of your statement when you said you had found that it was generally good down here. If it is good, then it can be made to be good all the time. There may have to be certain rules and

regulations that are drafted to insure this, but it's not only just a possibility, it's a probability that it can be done. So, in summary, the systems that are here now, and when I say systems, I talk about the condominium type systems. I won't comment on the individual septeic tank type systems. There are some potential problems with those, which I recognize. But going the route of small individual package plans versus the route of one large central collection system, I do think, to restate what someone else has said, might just be a waste of taxpayer's money. I think the EPA could very well spend it's money at some better locations, which would be better for the environment in general. I do think it would increase the density. Thank you.

MR. ZELLER: Thank you Mr. Melvin. We appreciate your comments. Very good comments. The next speaker I have is Mr. Bill Price, who is a developer with the Carolina Coastland Corporation. Mr. Price.

MR. PRICE: Thank you sir. I am a developer with Coastland Corporation. I have been down here for about thirteen years. I've often heard it said, or not often, but a friend of mine made the comment that environmentalists is one of the last persons who bought a house on the shore. I don't think that's necessarily true, because all of us are environmentalists in one way or another. We have an enviable part of the environment. We live in the environment and have to be responsible to that environment. The gentleman a few minutes ago made the comment that density was a problem. Well, I think I would carry it a step further and say, well, it's not density, but it's people. When we stop producing people, we won't have anymore problems, I suppose, with development on the barrier islands or anywhere else. But as you indicated, I believe you are the EPA manager for the Southeastern Region. . .

MR. ZELLER: Assistant Administrator for the Southeastern Region.

MR. PRICE: As we know, the Southeastern part of the United States is probably one of the fastest growing areas in the country, and with that we bring a lot of people down into this neck of the woods, especially North Carolina, who work and live and have children and go to school and etcetera, and we also like to have a place for vacations. A lot of people like the mountains, a lot of people want the seashore. And over the past several years, the coasts along the seashore have become booming areas. We seem to have a lot of folks who like to come to the seashore. Carteret County has been working on a 201 plan for about thirteen years that I know of. Is that about right, Walter?

(SOMEONE IN THE AUDIENCE): Almost.

MR. PRICE: I went to some sort of a water development conference down in Wilmington in '75 and '76, Wrightsville

Beach, I'm sorry, and a gentleman from the University of North Carolina made some comments there. He said that he was developing a study for ocean outfalls. I wrote him a couple of letters, and never was able to get anything. Then in 1981, I found out that it had been published. It had been published in 1977 or '78, and was able to get a copy of it. The summary of that statement, I will say this one more thing, I understand that the reports that were made, they go for about a hundred thousand dollars a pound. It was about "yea" thick, so I don't know...

MR. ZELLER: Maybe this was. . .

(The above two lines were unintelligible due to two parties talking at once.)

MR. PRICE: Maybe it was a two hundred thousand dollar report. Anyway, the thrust of it boiled down to one page, and said that insofar as Onslow Bay was concerned, which is this deal right out here, there was nothing wrong with ocean outfalls that he could tell or this group of people, in their report. I wrote a couple of letters to some folks, and tried to find out if there was nothing wrong with ocean outfalls, why is nothing happening with 201 plan of Carteret County. I never got a report or a response so that I understood, but the closest thing I could get was that we were waiting behind Dare County, who was also doing a summary or a report or having a report made for ocean outfalls,

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and that when that report was done, then the decision would be made by EPA or Coastal Regional Commission Group or whatever, to determine whether ocean outfall was going to be permitted. During this time, we were also involved in the septic tank debate. I put in some septic tanks in 1969 and 1970, and a number since then, and have really have not had any problems with them. They are monitored, they check the water quality in the area, in the well systems, and don't seem to find any problems. We suggest that septic tanks be put some yeast in a couple of times a year, and check their wells, and it seems to work fine.

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At that same water quality meeting that was held down in Wrightsville Beach, you had people stand up and say things like--we did a study in a trailer park on a finger island up here at Atlantic Beach, and we flushed down the toilet, and it was in the canal in two minutes. I'm not sure that that is any indication there is anything wrong with septic tanks. I'm sure it indicates that there is something wrong with the design of the installation, which may have been an outfall right into the creek, but it certainly doesn't necessarily indicate there was anything wrong with the septic tanks. In addition to that, there was a couple of instances noted on this island, of septic tank systems that were installed that were constantly giving trouble, but the amazing thing was that I have been, you know, been involved with development and watch these sorts of things, and you see people come in and put a septic tank system in and back fill it with clay, and then wonder why it won't work. But these are the ill-designed or ill-installed. Bad installations are historically the things that when you start, you know, people say that septic tanks are bad. Let's scare the world. They are the ones that they use as examples, and I think that's very unfortunate. As a matter of fact, I have here a CRC memorandum dated 1-20-81 that says multiple septic tanks are growing problems in the coastal area, and the thrust of this deal is, gee whiz, septic tanks are going to destroy the coast. Let's not have any more of them under any circumstances. And so we give them package treatment plants. I put in a couple of package treatment plants. As a matter of fact there is a couple of fellows back up there, a Mr. Dunn and Mr. Boone, have done real well I think, off of them trying to keep the things running, because they are absolutely, they are horrible. You absolutely can't keep them running all the time. Now you can--when you got all kinds of bells and whistles, and whistles behind the bells, and whistles behind the whistles, you got a dozen pumps on every one of them doing half a dozen different things, and then a pump comes in and that doesn't work, and if that doesn't work, you have to get one from up the street, put it in and keep it operating for a

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while, and these guys are running up and down the island here constantly, trying to keep eight or ten treatment plants running. There just isn't any way, in my view, that package treatment plants, without total persistent, consistent attention, can be made to continue. Now these things have only been in for what, six years, five or six years. The wiring has not burnt out of them yet, but it will be pretty quick, and the pumps is going to be gone, and all control devices will be gone, and they will have to rebuild everyone of them, and probably all the metal cabinets will be gone, so probably about five to eight years, you have to rebuild everyone of the electrical systems, in all these things, because of the extreme corrosion we have on this island. And I expect it is the same on just about every other island that we've come up with. But right now, they are working alright evidently, based on the monitoring systems that they have been working on. Of course, the owner is responsible, you know. One of those motors costs about seven hundred and fifty dollars. Then we've got a situation where I think I heard a few minutes ago, that about eighty percent of the treatment plants in the area are not being operated properly. This is a major, evidently, municipal treatment. . .

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MR. ZELLER: You're talking about treatment plants as a group of facilities, you know in the United States, you

know that generate some of the same things. It applies to them also.

MR. PRICE: But we are in a situation on the coast of North Carolina, and I suppose most coastal areas, where we have an economic interest, those of us who are in development, or industry or business or whatever it may be. And we see that the municipalities and cities all over the State are in a position where they go to EPA or the Feds or the State and say, we need some money to build a treatment plant to treat our sewage, and it may be built and perform properly or it may not, but whether it is operating at a hundred percent, it's still taking up its percentage to be a carrying capacity or whatever the river might be that they are dumping into. So they bring all that stuff downstream and it gets into the estuarine body of our areas, and that results in a degree of the percentage of the pollution that we are evidently responsible for, because of the runoff or nonpoint source or whatever you want to call it. It's going to the ocean anyway sometime. The question is, do you put it in directly and now, or do you let it filter in through the estuarine bodies like the one down in Calico Creek over here in Morehead City or over behind Beaufort. I think it is-- these areas are going to grow, and I think we are very short-sighted to depend on the small package systems, to depend on poliferation of septic tanks. I think that properly designed, properly implemented within limited densities, I don't see nothing wrong with that, but you can't go but just so far with them, I know. I can realize that, but I think that you really are creating an unfortunate situation when you don't permit the development of the ocean outfall program and the two on one plans, which is going to limit the growth of Eastern North Carolina. And maybe we want to. I know that it has been blamed--I think your crowd has been blamed over the last little while, for being the main limiter of growth. . .

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MR. ZELLER: Our crowd gets blamed for most everything.

MR. PRICE: The environmentalist bunch, yes. I would like to make a comment here about one of the reasons, it says, because the development of the barrier islands results in construction, which then results in Federal flood losses. Okay. So they put the monkey on your back to control development of sanitation regulations. I got a notice here the first of the week. It's from the Federal Flood Insurance people. It's a rate increase, that tells you how much it's going to go up, but there is also with it a bulletin that had a comment that I thought was very interesting. It says--they are talking about rate increase and everything--and they said they are increasing the rates, because they had such a tremendous loss ratio over the last couple of years. But then it says, 'however, the insurance data shows

that only a relatively small number of coast FIRM, which is Federal Insurance Rate Map program, buildings meeting or exceeding the base flood level criteria in these zones have been severely damaged by flood events with recurring frequencies of less than a hundred years'. I guess what that is saying is that the insurance losses that the Federal Flood Insurance Program has been experiencing are in those dwellings or structures that were built prior to the publication of the rate maps when people were building about any way they wanted to. So I don't really think that we could be blamed for those governmental losses at this point. Another thing sort of sticks in my craw. We're talking about closing shellfish waters. I'm sure that it is necessary and required at times, but if I'm wrong on this, I'd like for somebody to tell me right now, because I've talked with a couple of engineers, and I can't get this maybe perfectly clear in my mind. But as I understand it, when they test for infiltration or for runoff, they use the E. Coli as an indicator. Is that correct?

(SOMEONE IN THE AUDIENCE): That's correct.

MR. PRICE: But there is nothing necessarily wrong with E. Coli. It comes off of corn fields, comes out of grass, trees, everything. You know, everything's got E. Coli in it now. What you're trying to test for is viral bacteria that are harmful or injurious to human helath that may be picked up in shellfish and that sort of thing. Why haven't you got a testing system to test for the things that are wrong instead of a trace system, which is really nothing in it.

MR. COGGER: It's extremely difficult. . .

MR. ZELLER: Please identify yourself for the record.

MR. COGGER: Excuse me. Craig Cogger, Soil Science Department, N. C. State University. They have been working for quite a while on testing for viruses, you know the specific ones that cause problems, but it's due to the nature of the viruses, it is an extremely difficult procedure to do that, and it's not very reliable, and if there was a reliable method that could be run, reproducably, in a lot of labs, I think everyone would rather be testing for the viruses than for the coliform bacteria, but right now science isn't that good, the science isn't good enough to make that dependable. We feel, or the people who set this up feel, that it's better to dependably test for something that isn't the bad guy itself, but it keeps bad company. You'll find it where you find some of the pathogenic ones, rather than to unreliably test for the actual culprit.

MR. PRICE: Pathogenic is the word I'm looking for.

MR. ZELLER: Your point is well made. That issue has been discussed and debated many times. In a number of parts of the country, the shellfish areas are closed because of

natural runoff from coliform, strategic coli coliform bacteria now, from the woods and everywhere else where this bacteria lives in abundance, and reaches a number beyond which the Food and Drug Administration has said that you will not consume shellfish. Now, many people have advocated that we should go directly to the fecal coliform measurement, which of course, microbiologist can do that. They can measure coli coliform or fecal coliform. There is a great deal of reluctance on the part of Public Health officials to drop that coli coliform measurement, and move to a fecal coliform measurement. Your point is well made. That issue has been debated for ten years, and the Public Health people have remained stedfast in their belief that we should stand by the coli coliform measurement.

MR. STEINBECK: Steve Steinbeck. I might comment that North Carolina is presenting our case again, their argument of fecal coliform in New Orleans, and we are going under the fecal coliform standard in North Carolina. We also run total to satisfy the Federal requirements, but we are following the fecal coliform standard in North Carolina.

MR. ZELLER: I think the State of Alabama and a number of other states have also taken this approach. I think it is very reasonable personally, but then I am not charged with the responsibility in terms of, you know, of public health matters of shellfish consumption in interstate commerce.

MR. PRICE: Well, the thing that concerned me about it was that I understand that the fellow that goes out in a skiff and picks up little bottles and brings it back to test them, that when he goes out, he can just about tell exactly what the E. coli, I don't know about the fecal coli, but the E. coli count, he can tell what it is going to be before he goes out, based upon when it rained last, and he ends up being subject to the pressure of the fishermen as to the close of shellfish areas as opposed to public health, and I know it's a tough deal for him to be in, but it's also a thing that is not testing for something that is accurate and representative, but if you're saying you've gone to the fecal coliform, which is the appropriate check for pathogenic, then that is good to know.

MR. ZELLER: Dr. Terry, do you have a comment?

MR. TERRY: I wanted to ask MR. Steinbeck, are you using fecal coliform that shows ratios or just fecal coliform?

MR. STEINBECK: Unfortunately, laboratories on the coast don't have good, efficient capability of fecal strep. We are doing some work in Raleigh on fecal strep and fecal coliform ratio. It is still much debated and much researched. It is not yet founded, I think, in scientific fact.

MR. PRICE: Then it goes back a little bit. Anyway, I guess the result of this is that I feel like there are a lot of people that like to go to the coast. I think that

will continue. As a developer, I am concerned with some of the things that have happened as a result of low density, because you get into a lot of wood frame construction that gives you some fire problems. It also gives you some wind storm problems. I think if you use re-enforced concrete, based on whether the quality of life the community wanted to designate as being good for the area, and this is the way we would like it done. I think maybe it would be a little more reasonable say than to try to do it from these extraneous controls. As a last question, are ocean outfalls permitted on the coast of North Carolina currently?

MR. ZELLER: Ocean outfalls are not prohibited on the coast of North Carolina.

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MR. PRICE: Okay. Therefore, then either public or private development is possible along the Federal Environmental Protection Agency?

MR. ZELLER: I think we've talked about this at some extent and MR. Crum addressed that in his comments. What we've said in the draft environmental impact statement is that we should, on a case by case basis, assess the kinds of problems that we have, and try to respond to those from a water quality standpoint, and come up with what is necessary to resolve that particular problem, and we've outlined a strategy and approach where that could be done without locking ourselves into any kind of a sewer system, whether it be a regional system or anything else. We think we should keep all of our options available to us. There are all kinds of options and I think we have to look at what we are talking about for the immediate development, the immediate problems and in terms of what kind of development is there ultimately going to be on these islands. I don't know. I think we should always be careful. I've sat through a number of hearings like this, where we get into these problems with people, and I know there are--and I think it is fair to say that you should not expect no environmental regulators to control zoning and development of areas involving people. That's not our job. Now, we are here to protect the environment, and to see if you have people, that those people are protected with proper systems, but it's not up to us to try to develop an environmental program to control people. That's local officials' responsibility, and unfortunately, local officials don't meet that in all cases. But that is a problem that has to be addressed, and has to be developed. So don't look at your environmental regulator to solve those kind of problems. There are other ways to approach that, and what we're saying is that where we have problems, they should be addressed. You are correct in some of the comments that you made. There are some very bad functioning septic tank systems in this area, and they should be resolved. Something should be done about them.

MR. PRICE: But there are also some very good ones.

MR. ZELLER: Yes. There are also some very good ones. If they are good operating systems, it doesn't seem proper, you know, to penalize those individuals and those groups of individuals, and say you should pay to connect to a regional treatment system, when you don't need to. Now, by numbers, you may need the numbers to support these systems, but it's not fair to those individuals. That's why we said in the strategy, let's look at the problems and come up with the best water quality management at the least cost, and I think it's a very good approach.

MR. PRICE: I think it's reasonable and I agree with the comments you just made. Just as a final comment, I would like to say that I feel like that as long as we go--the further we go with the development of coastal North Carolina, that we do need to get into the ocean outfall philosophy, and that needs to be done in a joint effort, rather than in individual situations.

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MR. ZELLER: That may be, and that's really not what we are here to try to resolve tonight. You may be correct, and that may be the ultimate answer.

MR. PRICE: But you are establishing what will happen with the promulgation of whatever this might be, because if you end up with a lot of individual treatment plants or individual septic tanks, then you will never get into ocean outfalls.

MR. ZELLER: Well, I think it is a question that has to be addressed, and that's the whole purpose of what we've gone into. I will have some more things to say in the final environmental impact statement relative to all these comments. Yours is not the first one that has come up with ocean outfalls, nor will it be the last.

MR. PRICE: One gentleman talked on public notification. I couldn't find a copy of this deal, and I checked by the Chamberof Commerce before I came over here, and they didn't have one either.

MR. ZELLER: Notification of what?

MR. PRICE: I got notification verbally, and this deal right here, I don't know, has this been passed out before to other folks?

MR. ZELLER: Yes.

MR. CRUM: I'll be happy to mail you one as soon as I get back to my office next week.

Mr. PRICE: Well, I'd like to put the Carteret County Chamber of Commerce on your mailing list.

MR. CRUM: Okay. We'll be happy to do that.

MR. ZELLER: Thank you very much. These are all the individuals that indicated they wanted to make formal comments. Yes, would you like to make a statement?

MR. DAVID CLEMENT: I must have checked the wrong box there.

May I?

MR. ZELLER: Yes, please. Please give your name for the court reporter, and we are happy to have you.

MR. CLEMENT: Well, I'm David Clement from Onslow County. I don't have the technical or professional background or points of view of many of your other speakers here. I represent several conservation groups in Onslow County. As a matter of fact, my trip up here is about a hundred miles round trip. So others couldn't come, and asked me to commen If we make any comment at all, it has to do with the fact that the barrier islands do not need to have their development subsidized by the Federal Government any more than has been done. Our barrier islands are developing at a tremendous rate right now, and nothing stands in the way of that development, other than the wishes of the people and the controls imposed by the local government. It has been mentioned that in Onslow County, a major sewage system is under development right now. This has a tremendous impact on the ability to develop that area down there, and in the absence of a 201 plan or any Federal assistance in that direction. The developer was pleased for permission to go ahead with his sewage plan.

The problems of density and pollution don't all just come down to E. coli. They come down by oil and beer cans and chemicals and stuff like that. It's just the way you live. Every day we have a can full of junk that we don't know what to do with, and we just pour it some place. And if more and more people are present in fragile areas, there's just going to be a lot of that pouring around. Local government has the ability to come to grips with the density problem and the pollution problems. There is probably no better way to solve the problems which may develop on the barrier islands than for local governments to, in fact, take their stand on that. So the people I represent in these environmental groups are not anxious to see the Federal government subsidize greater development in those areas. Thank you, sir.

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MR. ZELLER: I agree with you. Thank you for the comments. We appreciate that. Is there anyone else who would like to make a statement?

(No response.)

MR. ZELLER: Does anybody have a question. Our real purpose for holding these hearings is to try to discuss these issues and clarify any of these issues that may have come up. Does anybody have any questions they would like to raise at this time. We will try to answer it?

(No response.)

MR. ZELLER: Well, it looks like we've pretty well covered the ground. Let me remind you again that the record of this public hearing will be held open until August the 31st,

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and any written comments that we receive prior to that time will become a part of the record, and if you wish to make a further comment, please feel free to do so, and address that comment to Mr. E. T. Heinen, whose name and address appears on the agenda that was handed out to you at the beginning of the meeting.

Let me thank all of you again for coming here tonight and being a part of this hearing. I feel like this has been a good hearing, and we have had some meaningful exchange of information and some issues that have been raised that it is appropriate for the government to respond to. We are committed to assisting local governments in resolving public health and water quality problems in a cost effective way, and your comments will help us in meeting that goal. The comments received this evening and during the comment period will be considered and responded to in a final environmental impact statement. The final EIS will consist of the Agency's final decision, a summary of the draft EIS and pertinent information or evaluations that have developed since publication of the draft and comments received and EPA's responses will be in the final EIS. The transcript of this hearing will also be included. Those of you who have commented tonight or will submit written comments will receive a copy of that final environmental impact statement.

That constitutes the business of this evening. Let me thank you again for being here, and we'll be around here for a while, and be happy to talk to anyone that wants to remain. I'll close this hearing. Thank you again.

(END OF TRANSCRIPT)

UNITED STATES ENVIRONMENTAL AGENCY

PUBLIC HEARING

ON

THE NORTH CAROLINA BARRIER ISLANDS DRAFT EIS

August 25, 1983

8:00 O'clock P.M.

At

North Carolina Marine Resources Center

Manteo, North Carolina

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PRESIDING:

Mr. Howard Zeller
Assistant Regional Administrator
Region IV
Atlanta, Georgia

Mr. Bowman Crumm
Project Manager
Region IV
Atlanta, Georgia

Dr. Claud Terry
Consultant
Region IV
Atlanta, Georgia

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MR. ZELLER: It's a little past eight o'clock and although we may have some other people coming in, I would like to convene the hearing at this time. First of all, let me welcome all of you to this public hearing which is being held on the EIS Statement which addresses wastewater management for the North Carolina Barrier Islands.

Let me begin by introducing myself and the rest of the panel that is with me. My name is Howard Zeller, and I am the Assistant Regional Administrator of the IV Region of the South United States, the IV Region or Region IV, and my office is in Atlanta, Georgia. With me from the Environmental Agency is Mr. Bowman Crumm who is the Project Manager of the Environmental Impact Statement for which we are holding this hearing tonight. And I would like to introduce Doctor Claud Terry who is standing in the rear. Doctor Terry is our consultant who is primarily responsible for developing the data and writing the report for which we are holding the hearing.

The purpose of the hearing is to receive public comment and other agencies' comments on the Draft of the Impact Statement. The Impact Statement for the Barrier Islands Wastewater Management provides guidance for the local governments and their contractors, assistance in the planning for wastewater management, and the preparation of the facilities. This plan is the first step in the EPA's three-step construction grant program for the wastewater managements. Now, to be eligible for federal funding, proposed facilities must be part of an approved facilities plan. To identify these costly means of resolving public health and water quality problems resulting from improperly treated sanitary wastewater, Steps 2 and 3 of the construction grants program are for design and construction, respectively.

These steps follow completion and approval of the facilities plan. Now, all but one of the Draft 201 facilities plan for the North Carolina Barrier Islands have proposed the construction of extensive wastewater collection, transportation and treatment facilities to serve the larger portions of these islands. After we made an environmental review of the proposed facilities the Environmental Protection Agency had serious concerns about the costs of these facilities relative to the people that would be served.

The National Environmental Policy Act requires federal agencies to prepare an environmental impact for the major federal actions that may significantly effect the quality of the human environment. Because of the environmental complexities and water issues that were involved in these projects, EPA made a decision to prepare an Environmental Impact Statement. Then in September of 1980 we published our notice of the intent prepared on the islands.

And this public hearing tonight is being held to receive comments on the Draft Environmental Impact Statement. EPA wishes to encourage public participation in the federal decision making process and the development and improve public understanding of the federally funded project.

Now, the craft which was made available to the public and to the EPA after the federal activities on July 9, 1983, as was listed in the federal register on July 15, 1983. The Draft EIS comment period will extend until August 3, 1983. Comments received this evening and during the comment period will become a part of the record.

This is the third public hearing that the Environmental Protection Agency has held this week. The first was in Brunswick County and then in Moorehead City and this is the third public hearing on the docket. We have received numerous comments from the public and from those interested in the proceeding, and we will respond to all of those issues as well as the issues raised here tonight in the final publication which will be three to four months from now.

Now, before I go into accepting testimony from the floor from those individuals that wish to make a statement, I would like to have Mr. Crumm, who is the Project Officer, give us a very brief summary of what's included in the EIS and what the EPA proposes in the document. Mr. Crumm.

MR. CRUMM: Thank you, Mr. Zeller. Good evening.

This Environmental Impact Statement or EIS has been prepared in response to issues raised during the review of the five Draft 201 Facilities Plans. These plans proposed the construction of wastewater collection, transportation and treatment facilities to serve large portions of North Carolina's Barrier Islands. Through the EIS process, wastewater management alternatives for the Barrier Islands were developed and evaluated and a strategy is proposed.

The review of these Draft 201 Plans and the scoping process for the EIS identified six basic issues to be addresses. The issues and the major conclusions of the EIS are as follows:

Number 1: Water Quality - It is important to identify existing water quality problems in order to determine the need for additional wastewater facilities. The Draft 201 Plans pointed to septic tanks on Barrier Islands as the reason for closed shellfishing waters. The data reviewed through the EIS process do not confirm this conclusion. The surface runoff from the mainland appears to be the cause of the closing except in a few isolated cases.

Number 2: Alternative Wastewater Techniques - The Draft 201 Plans do not fully evaluate on-site and community system technologies for wastewater management on Barrier Islands. The EIS has found that these systems may provide more cost effective solutions to solve existing water quality and public health problems while providing for desired development. The EIS proposes additional site specific analyses of these alternatives.

Issue Number 3: Financial Impact on Local Governments - Providing wastewater treatment is a major financial undertaking for a community and its residents. The financial and management implications to the local governments and the system users can be significant. The Draft 201 Plans do not demonstrate the financial and institutional capability of these communities to support the proposed system. The EIS provides guidance for local governments to evaluate and resolve these potentially severe impacts.

Number 4: Nonpoint Source Pollution - The shellfishing waters have been closed where sewer systems exist in coastal areas of the southeast. Studies have shown many of these closures to result from nonpoint runoff. New wastewater facilities may promote higher density development thus increasing the potential for nonpoint source pollution of estuarine waters.

Issue Number 5: Groundwater - The potential impact on groundwater hydrology and groundwater quality is a major issue when considering soil absorption wastewater systems. Although few of the Barrier Island communities use the surficial acquifer for water supply, the effects of any proposed system on groundwater should be carefully considered.

The EIS proposes a method for determining the water

table response to soil absorption disposal of wastewater. The EIS also recommends collection of data in certain instances. EPA has initiated a study which will demonstrate this water table response method and will collect groundwater quality data for three locations on the North Carolina Barrier Islands. The information from this study along with the method developed by the EIS should significantly improve the ability to predict the impacts on groundwater from soil absorption disposal. Results from this study should be available by the end of next year.

And Issue Number 6: Sensitive Natural Areas - The primary and secondary impacts of wastewater facilities on sensitive areas such as dunes, wetlands and estuarine waters should be considered in planning for wastewater facilities.

The EIS process included several steps. First, an inventory of existing conditions was prepared. Next, alternative wastewater management strategies were developed. Third, the strategies were evaluated, aided by using a case study. Finally, this entire process was summarized and published in the Draft EIS.

I would now like to summarize the strategies addressed by the EIS. They include the proposed EIS strategy, the 201 strategy and the no federal action strategy.

A special strategy is developed in this EIS. This approach is intended to provide assistance to local governments in planning for wastewater management. The approach encourages communities involved in facilities planning to update and revise their Draft 201 Plans as appropriate using special procedures developed by this EIS.

The procedures developed by this EIS refine those normally undertaken in the preparation of a 201 Plan. The procedures are consistent with 201 construction grants regulations and other facilities plan preparation guidance and are tailored to address the unique environmental and socioeconomic conditions on the North Carolina Barrier Islands. The procedures are designed to address the six issue areas identified earlier. Special attention is given to two areas: 1) A thorough evaluation of potentially reasonable wastewater technologies, especially on-site and small community systems, and 2) The financial and institutional impacts of operating and maintaining wastewater management systems.

The procedures fall into three major groupings. One, determining need and estimating flows; two, developing alternative wastewater management systems, and three, evaluating these alternative systems.

An overview of these procedures, Figure 11.1 in the Draft EIS, is part of the handout you received. The procedures are described in detail in the Draft EIS and the Alternatives Development Technical Reference Guide.

The EIS has compiled information and developed tools which will be helpful to those planning for wastewater management. These tools include a computerized data base of natural resource information, details on wastewater management options, on-site wastewater treatment and disposal system siting criteria, a financial planning handbook with worksheets and a predictive groundwater model. These procedures and tools are designed to allow identification of all viable alternative systems and to promote consideration of the major potential impacts on both the man-made and natural environments.

The EIS compared the proposed strategy to the alternatives of no action -- what we call no federal action strategy -- and of approving the Draft 201 Plans as submitted or the 201 strategy.

The no federal action strategy would be a decision by EPA not to participate in the further planning or funding of wastewater management facilities in the study area. The analysis of this strategy concludes that there would be continued growth on the Barrier Islands regardless of whether publicly-owned and funded facilities are constructed. Without additional EPA assistance, existing wastewater management practices are likely to continue. Localized state regulations would govern the use of soil absorption systems. Individual property owners would be responsible for providing adequate treatment and would bear the cost of renovating failing systems or installing new systems.

The 201 strategy would be the approval and implementation of the Draft Plans without significant changes. The plans would have to be updated in certain areas such as costs. Those plans proposing ocean outfalls, here in Dare County and in Carteret County, would have to incorporate the results of site-specific outfall surveys. The one in Dare County has been completed in the past year. The Carteret County plan for the Barrier Islands would have to be modified since one of the two communities involved elected not to participate.

One of the six plans, Hatteras Island, proposes no action because it was determined that a system is not economically feasible at this time. The other five plans exhibit several similarities. Each plan calls for the replacement of existing on-site wastewater systems, mostly septic systems, with centralized collection, transmission, treatment and disposal systems. These plans justified the need for facilities based on the belief that shellfishing harvest area closings were caused by existing on-site systems. The plans also projected additional shellfish area closings with continued residential and commercial developments using on-site systems.

Another similarity is the proposal to provide sewer lines to most areas of these communities. Pumping stations and force mains are to be used in all facilities to transport effluent to the treatment plant. Secondary treatment is proposed for each facility. Ocean disposal is proposed in Dare and Carteret Counties, spray disposal in topsoil/surf city and southwestern Brunswick County and surface water discharge to the Cape Fear River in southeastern Brunswick County.

The EIS developed strategy is proposed as a means of assisting local communities in finding a cost effective affordable meens of providing wastewater management. The approach is designed to allow maximum flexibility for local governments to accomodate desired growth.

The EIS concludes that the 201 strategy would result in costly systems which could produce adverse secondary impacts to local governments. The no federal action strategy would leave certain water quality problems unresolved and could increase the probability of future problems. No federal action would likely eliminate the continuation of facilities planning.

The EIS strategy incorporates the following beneficial features: 1) The procedures promote documenting and then resolving water quality problems; 2) The procedures provide flexibility for meeting existing and future wastewater management needs; 3) The procedures promote maximum local decision making and provide for disclosure of financial and institutional impacts, and The procedures minimize costs to communities by promoting consideration of less expensive alternatives.

The construction grants program has been delegated to the State of North Carolina. Any future wastewater management projects will have to meet state requirements. To receive federal funding, any project must be eligible for funding based on its position on the state priority list. Also, any project to be funded must meet the construction grant regulations applicable at the time of funding.

I look forward to receiving your comments tonight and the suggestions for improving the methods proposed in this EIS for wastewater management planning are most welcome.

Mr. Zeller.

MR. ZELLER: Thank you, Mr. Crumm. Now I'm ready to go ahead and ask the speakers who have indicated they wish to speak to come forward. Before I do that, let me remind all of you again that it's important that you register and fill out a registration card as an attendee at this hearing so that we can keep you up on the progress and what the final decision is as it's developed. So if you haven't filled out a registration card, before you leave please do so.

I would like at this time to recognize Mr. James Murphy who is a commissioner from Kill Devil Hills present at this meeting. Mr. Murphy, if you would identify yourself for me.

MR. MURPHY: I didn't want to speak.

MR. ZELLER: Sir?

MR. MURPHY: I said I didn't care to speak.

MR. ZELLER: No, but I just wanted to identify you as being present at the hearing and acknowledge you here. Thank you for coming.

Another public official I would like to identify who has indicated that he does wish to speak is Mr. Donald Bryant who is Mayor of the town of Nags Head. Mr. Bryant.

We ask that you to state your name for the record so that we can identify you, and we are pleased to have you here at this meeting.

MAYOR BRYANT: Thank you. I'm Donald Bryant, Mayor of Nags Head, North Carolina. I won't say much this evening. I do not intend to attempt to refute the EIS Draft that I have read as I'm not an engineer, and I'm not qualified to take exception to the details that are outlined in the EIS. I merely want to state from a local government standpoint it seems to me that we are faced with, if you will, a fate complete. In other words the answer to the problem may have been predetermined by the EIS process. Since the delays that have occurred have placed us in a position of being forced into a time frame that would result in a significant loss of federal funding for whatever alternative is selected by the local governments. Most of the people here know that I'm not a strong proponent of uncontrolled

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growth. But reading the EIS leads me to the conclusion that it may address more the density question than the wastewater treatment question.

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We believe the problem of the wastewater disposal is one of the most, if not the most, critical and important issue facing us, and we are distressed that the options available to us seem to have been significantly narrowed by the EPA process.

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Thank you very much for the opportunity to speak to you.

MR. ZELLER: Thank you very much Mr. Bryant. Some of the issues that you raised have been brought out at other hearings, particularly this question on -- you referred to delays and federal funding. We intend to address that whole issue of the priority list and how, you know, how this is a factor in terms of federal grants. And I think we can satisfactorily resolve that issue.

There have been a number of problems relative to getting some of these facilities on the priority list where they would be eligible for grants. The situation in this country is simply that there are not enough dollars to do all of the things that need to be done. And we have developed these priority lists which have certain criteria involved in getting to the top of the list. And there's a need to have a further explanation, and we will address that issue in the final EIS.

Secondly, a point I would respond to, I believe we

did -- I feel like and we'll certainly have another look at it, but I feel like that the document does address the wastewater treatment. Now, I don't know how you can avoid people and density problems when you address wastewater treatment. And that's tied into every wastewater treatment that's ever been built in this country, and ever will be built in this country, as people dependent as is nearly everything else. So I don't know how to avoid that. So the issue is addressed, but I think it's secondarily addressed.

And I also feel like, I might point out at this time, that the document does develop a strategy. And instead of saying let's simply go ahead with just one approach to resolving this problem, let's look at each one of these problems and let's make a site-specific analysis of each one of these problems. And the problem might very well be different in this community than some other community. So we have said let's not adopt a common approach to try to solve all of these problems. Let's look at these problems individually and come up with a site-specific analysis. And there are a lot of things that are going to have to be analyzed.

First of all, you know when you put systems in place, the people that use those systems have to pay for them. And depending on the number of people involved and the cost of putting it in place would depend on how much those people would have to pay to get the job done. There are a great many factors that come into this that we feel like need to be evaluated so that we get the best possible utilization out of these grant dollars that accomplish what we need to accomplish in terms of water quality and to provide the kind of development that North Carolina wants on the Barrier Islands. Thank you.

Let me ask then the next speaker to come forward which is Mr. Barry Shannon from the Southern Shores Civic Association. Mr. Shannon.

MR. SHANNON: My name is Barry Shannon, and I'm representing Southern Shores Civic Association. The Association has approximately 12 hundred members, and in our opinion its views on the EIS relating to the sewage disposal systems are representative of those of the majority of the people on the Outer Banks. We consider the EIS to be an excellent study and commend the EPA on its development and the positions taken. The 201 strategy is clearly out of line with the needs and desires of the people in the area. It cannot be supported cost-wise and would encourage high density development. The carrying capacity of the Outer Banks simply cannot stand such development. The operational costs, repair costs due to storm damage and costs of sewage lines and et cetera were not considered in the initial 201 proposals, and would be beyond the capabilities of the local jurisdictions to finance.

The federal government should not finance such marginal projects. In summary, we harmonily agree that the 201 strategy be abandoned.

The no action federal -- excuse me. The no federal action would continue current wastewater practices with the local, state regulations governing. There would be no federal support and costs would be borne by the users. This strategy has merit, and would facilitate the control of the government. We can support this strategy.

The EIS strategy would supplement the no federal action strategy by supplying assistance to the local government in the completion of the planning for the wastewater management programs. This does have merit and the acceptable guidelines would be provided and financial assistance given to the local jurisdictions to assist in the planning. In no way, however, if the EIS strategy is approved should such funds be used to continue or to resurrect the 201 strategy and planning. With that reservation we can support the EIS strategy providing the community facilities are not promoted aggressively. Where they are used, they should be of high quality and meet high standards.

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Too often community facilities falter and fail because of poor quality and management.

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In summary, we oppose the 201 strategy and support the EPA position on this matter. We support the no federal action strategy, but consider minimum federal support to complete planning under this strategy would be worthwhile. This, in effect, is the EIS strategy which we support and recommend be adopted, taking into account the previous comments. Thank you.

MR. ZELLER: Thank you, Mr. Shannon. We appreciate your being here and giving us that statement. I certainly agree in the comments that you made relative to maintenance and proper operation of small on-site and community systems. It's been my experience over many years that these systems work well, but they will not work well if they are not properly operated and properly maintained. They can do the job. And that has to be a very important key for this stage of strategy that has been proposed. You simply have to have proper maintenance and operation or this will not be successful and your statement points that out. And I wanted to share with you my agreement along those lines, because a number of these systems are in place and I think they are doing the job.

Next, let me ask Mr. Steve Sawin. He indicated that he probably wanted to make a statement, and it looks like you have decided that you do want to make a statement.

MR. SAWIN: Steve Sawin. I indicated that I probably because I've never come to a public hearing where I didn't. I am on the advisory committee for the EIS and have followed this

development from its inception, although I must say having about six hundred pages dumped on me in July and being told that we were having this public hearing at this time caught me quite off guard, and I haven't read all of the latest material.

My comments will be based on my relatively unique perspective in that I have just bought a community system that floundered and went bankrupt. And I find that the EIS strategy makes comments about the advisibility of small community systems which do not properly take into account what you just were talking about. It is easy to say that of course all of this hinges on proper and good management, but the costs to the state and to the communities and the counties in ensuring that a large number of small community systems are properly managed can be considerably greater than the costs in managing the central system that they own.

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Recently, and I'm not sure of all of the facts, but recently the State Department of Health tried to make a change in the regulations regarding sewage treatment operators and licensees to lower the number of plants, small community systems that they could manage on a given license. And I heard rumors, and I have not checked the reliability of them, that this was instigated by finding that out in western North Carolina there was one licensee who was managing fifty small community systems, one person. If this is in fact true, then there is no way that those fifty systems could be well managed.

So as we go through the EIS strategy, which I would support, I think much greater detail than has been given should be given to how does the Dare County Board of Health, Department of Health, manage the small community systems. Or if DEM is going to watch them, how do they? Because the one that I have just acquired has created enough headaches for the whole county and the DEM over in Greenville in the last two years, and is a case study on how it shouldn't be done. I thank you.

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MR. ZELLER: Thank you. We will have to address that issue. That issue will be addressed in the final impact statement. It's something that has come up in all of these hearings relative to these type systems. Again, it's consistent with my experience and I think anyone who's had experience with wastewater treatment that these small community systems simply have to be operated properly. And let me point out that that's not -- that proper maintenance and operation is not restricted to small community systems by any means. A recent study, and I pointed this out in one of the other hearings, a recent study that was conducted by the Environmental Protection Agency on the operation and effectiveness of the municipal waste treatment facilities in this country showed that about eighty percent of the plants were not operating nearly as well as they should be. And you know that's -- that's a real tradegy and one that we have

to get to the heart of, because this year alone in this country we are spending 2.4 billion dollars for construction grants for constructing publicly owned, you know, owned and operated waste treatment works. And if eighty percent of these that we're spending that kind of money for aren't operating right, we've got to get off our -- you know, off our cans and see that something is done. So the problem, you know, when I speak of that problem, I am not saying that it is universally addressed towards small systems on Barrier Islands. It's a general statement, but it's important -- particularly important to the locale that we have been looking at and the subject of these hearings that we have that kind of operation.

Thank you very much. We'll want to address that in the final EIS, and I'm sure the state is aware of that. And I think the state is intending and will take proper action. I might also add this. The State of North Carolina has been a real leader in this area and has a lot of recognition as being one of the states that does a good job in this area. So I think we can expect the state to come through with what we need to have done, and I feel sure that's going to happen. This is also something that we will be talking with the state officials about further as we begin to implement this. Thank you very much.

Next I have an indication from Mr. and Mrs. John Reese that they may wish to make a statement? You changed your minds? Well, did we answer your question? Did you have a question you wanted to ask?

MRS. REESE: No. I think the main thing I was concerned about down here was the fact that water seems to be such a tight commodity and wondering -- I agree with the choice that I think they have made, but just hoping that the demands of the systems wouldn't decrease the water supply that is available.

MR. ZELLER: Thank you very much, Mrs. Reese. We share your concern. And a very important part of this study is addressed to groundwater and what impacts would be on groundwater as a result of any of these kinds of systems. We don't have all of the data on that, but there is a very thorough study that will be made putting down test wells and measuring groundwater quality and movement of groundwater and all of these issues that are important to have assurance that this precious commodity as you pointed out will be protected by any system that is put in place. That goes without saying. That absolutely has to be done.

These are all of the individuals that I have who have indicated that they wish to speak or make a statement. I think it's important when we have meetings like this that everybody have an understanding of what we are proposing. And if you have any questions or if anybody else wants to make a

statement or ask a question, I'll be happy to respond to that at this time. Is there anybody in the audience who wants to raise an issue or talk about any of the points in the EIS? This is a good opportunity to do that.

MR. SAWIN: I have a question.

MR. ZELLER: Please give your name again for the record, please.

MR. SAWIN: I'm Steve Sawin. I have a question which may not have anything to do with the EIS, but I heard about a week ago that the EPA is beginning to do studies on the waste treatment -- or not the waste treatment effects, but effects on high water marshes or estuarine marshes by what effect it has if you put wastewater into them. Is -- do you know where I can get more information on that?

MR. ZELLER: Yes. We presently have a study underway along the lines that you mentioned, sir. Basically we're looking at what the impact would be of discharging waste into saltwater and freshwater wetland areas recognizing the importance of these wetland areas and how effective they can be in terms of natural purification. You know, nature is the best waste treatment system that's ever been devised. And we feel like there may be some benefits to these wetlands in terms of the natural enrichment that would be involved as well as their ability to serve as waste treatment systems. We also realize that

that this dollar business on construction grants, four billion, on waste treatment plants is limited and we need to get all of the help we can wherever we can find it. So this is the study that's underway. And it's not completed at this time. And maybe, Bo, you can add a little more to that about some of the details of the study, when it will be completed. But it is, I think, a very good study and is going to give us some very meaningful information and I think will be helpful in a lot of areas. And we are looking at a lot of different things such as discharge of certain waste from commercial fishing operations, freeze water from shrimp boats and wash water that has a very high organic or biochemical oxygen demand and loads down the waste treatment systems when it has to be treated. But we think put into these wetlands that it can be naturally treated because we are talking about natural constituents there. We're not talking about anything toxic or harmful. And we have a lot of good feeling about that study.

Let me ask Bo Crumm to talk a little bit more about it. Bo.

MR. CRUMM: Well, that study has recently gotten underway, and I am honestly not sure about the time table. But is is one of my fellow project officers that is in charge of that study, and I would be delighted for anyone that would like to indicate that would be interested in following that, participating

in it possibly, and receive all of the mailings, just let me know after the hearing and I'll be happy to do that. Doctor Terry, could you --

DOCTOR TERRY: Yes, Bo. There is a phase one document out of the freshwater wetlands --

MR. CRUMM: Right.

DOCTOR TERRY: So if you are interested in that, I believe that phase one document is DEIS --

MR. CRUMM: That's available, yes.

DOCTOR TERRY: It's not DEIS --

MR. CRUMM: It's at the draft stage. Yes. The freshwater wetland study is in two phases and the first phase is ready. The saltwater wetlands is just begun and there hasn't been any publication on that yet, but like you said, that document is available, in limited numbers, but there are a few left. And please let me know and I'll be happy to see that anyone who wishes is put on the mailing list and is kept in touch with the progress of either one of those studies.

MR. ZELLER: That was Doctor Terry, by the way, who made that comment a little while back. I think these are very interesting studies and I feel like they may have an application in communities like this where we have a lot of commercial fishermen and some wastewater problems that are associated with this. So we are looking forward to getting that kind of data base in place to help us in the process.

Anyone else?

MR. WALSH: I'm Allan Walsh from Colington. Does the peat-mining operation fit into this story -- this study?

MR. ZELLER: Well, the peat-mining operation doesn't fit into this story here, but it certainly is a story.

MR. WALSH: Is the EPA maintaining some control over it?

MR. ZELLER: Yes. We have some controls. Frankly speaking, we have limited controls in most of the peat-mining operations. We are talking with the State of North Carolina. They have agreed with us. We have some concerns about what some of the overall environmental impacts maybe on the peat-mining in the Albemarle Peninsula. I've been familiar with what has been going on there in the past ten years and have made a number of site visits there. And of course there is an energy facility there that is going to involve the production of methyl using peat as fuel that is a pilot experimental study being done by the Department of Energy. A number of agriculture operations are looking at the possibility of marketing peat as an energy fuel and what can be done and of course, they are interested in using those lands for agricultural purposes. There are a number of environmental concerns that we have on this kind of an operation, the least of which is what happens to those wetlands when the peat

is mined and all of those general farming activities when those wetlands are impacted. The balance of nature, of course, if very important in any system, and we're taking a big chunk of wetlands out of a system converting it to other uses. And we feel like we need to develop some information. We're doing a study at Cooley Farms (sic) right now on what kind of effect is going to be involved. So yes, we do have an involvement in that and do have some concerns. It's not part of this study, but is part of something that EPA is doing.

MR. WALSH: Is that going to be published?

MR. ZELLER: Yes.

MR. WALSH: Is this operation considered point source?

MR. ZELLER: Talking about the --

MR. WALSH: The discharge --

MR. ZELLER: -- peat mining?

MR. WALSH: The runoff from that? Is that considered --

MR. ZELLER: No, no. Most of it is not. There will not be any point source discharge. And of course, therein, some of the more serious problems associated with it will be, of course, from the nonpoint source discharge. We know when that land is cleared we have processes that take place when we remove the cover and take the water out and certain elements like mercury become much higher and show up as runoff in the rivers and streams. And we know we have a flow of nutrients, pesticides as nonpoint source into the waterways that create some problems. And we're concerned about all of these things.

MR. WALSH: It's not actually wastewater, is it?

MR. ZELLER: No. It's when -- normally when we say wastewater we think of that pipe or that point source, and --

MR. WALSH: But that has a pronounced effect on the--

MR. ZELLER: Yes. Nopoint pollution, just as a general term, is one of the more serious problems we have in this country. As we pointed out earlier here in this study, you know, that type of nonpoint source or natural runoff is the major problem in closing shellfish beds in the Barrier Islands area. And in this case it's bacteria, but nonpoint source runoff as bacteria, nutrients which cause excessive algea growth and sometimes problems, pesticides. All of those things.

MR. WALSH: Do you categorize that as industrial?

MR. ZELLER: No. Most of the nonpoint source are probably --

MR. WALSH: No, I'm sorry. I mean the peat-mining problem. Is that considered an industrial problem?

MR. ZELLER: I think it's probably kind of in-between. It's not really an industrial activity because it's associated with changing the use of the land and converting wetlands

towards other uses. Now this comes under a different permit system usually a 404 type permit through the Corps of Engineer.

MR. WALSH: Is the state more active than the EPA is?

MR. ZELLER: The state and EPA are both very active in this area.

MR. WALSH: Pulling your technical know-how?

MR. ZELLER: Yes. We are both very active. I think there is someone here from the state. Is that right? Yes.

(Unidentified:) I'm here from the state.

MR. ZELLER: Would you want to make a comment?

(Unidentified:) No, not really. I don't have any comment.

MR. ZELLER: Okay. You don't disagree with what I said?

(Unidentified:) No.

MR. ZELLER: Good. It's always bad to have a disagreement. Does anyone else have a question or comment?

MR. WALSH: I'm sorry. I think maybe I got off the track.

MR. ZELLER: No. We're in the area, and --

MR. WALSH: That's what I thought.

MR. ZELLER: -- I'm pleased to see an awareness and concern and some interest in this, because I've got some concern and interest in this, and I'm glad to see the issue raised. It's one that needs to be addressed.

Well, is there anybody else that wants to raise an issue or question? Well, all right. Let me make a few statements and I'll go ahead and close this hearing out and we'll be around here for awhile and will be glad to talk to any of you who may want to come up afterwards.

Let me remind you again that the hearing record will remain open until August 31st, and any written comment that anybody wishes to make can be received up to that time and considered part of the official record of this hearing. The place to send it is the address that appears at the bottom of that handout that was given to you when you came in. It's to our office at EPA in Atlanta. The address is listed on that handout.

I want to thank you all for being here. I appreciate your coming, and we appreciate your comments. We are committed to working with local governments in resolving public health and water quality problems in a cost-effective way. Your comments tonight have helped us to significantly meet that goal. The comments that have been received this evening and during the comment period will be carefully considered and they will all be responded to in the final environmental impact statement. The final EIS will be the agency's final decision. It will also have a summary of the draft and will have any

pertinent additional information or evaluations that have developed since the publication of the draft and the comments received and EPA's responses.

I think one of the more significant things, Mr. Crumm, will probably be that groundwater study that will be included in the final, and that will be a very important piece of information. In the final Environmental Impact Statement there will also be a transcript of this hearing. Those of you commented tonight or submitted written comments will receive a copy of the final EIS and I think everyone who is here who has registered also will receive a final copy of the EIS.

Again, I want to thank you for your appearance here tonight and for your participation in the hearing. And if there are no further comments I am going to close the hearing right now.

******

CERTIFICATE

STATE OF NORTH CAROLINA,
COUNTY OF DARE, to-wit:

I, Darlene G. Chambers, Notary Public in and for the State of North Carolina, do hereby certify that the foregoing is a correct transcription of the hearing taken by me in machine shorthand and reduced to typewriting by me personally, at the August 25, 1983 public hearing held by the Environmental Protection Agency of the United States in the North Carolina Marine Resources Center, Manteo, North Carolina.

Given under my hand this 3rd day of September, 1983.

Darlene G. Chambers
Notary Public

My Commission Expires:
February 15, 1987.

(SEAL)

D. EPA Responses to Public Hearing Comments

T-1. EPA realizes that countywide population projections may vary among parties calculating these totals. However, difficulties are encountered in disaggregating these figures to the 201 planning area level and, below that, to specific barrier islands commuities which are the focus of this EIS. Furthermore, EPA is required to base its funding decisions on OBERS population projections alone.

T-2. EPA understands that the countywide housing inventory and numbers of permanent residents are growing, but again, these figures are not specific to barrier island communities.

T-3. Many lots measuring 50' x 100' can be developed using on-site systems when certain conditions are met. See Draft EIS Appendix E, page E-3, for a lot diagram. Other typical lot configurations are also shown in this Appendix.

T-4. "Related mainlands" are those portions of each 201 study area which are not on barrier islands.

T-5. It is possible that when the draft 201 Plans are updated, a central or regional system will prove to be the most cost effective and environmentally sound solution for the island and/or mainland communities. EPA cannot predict the outcome at this time. See T-3 regarding small lots.

T-6. EPA is aware of this aspect of seasonal housing usage.

T-7. This EIS does not dictate the type of wastewater management system that an individual community must have. It does provide assistance in planning for the most cost-effective and environmentally sound system.

T-8. See W-27.

T-9. See W-42.

T-10. See W-29 through W-32.

T-11. Wastewater management and density of development are interdependent issues. The EIS is suggesting procedures to evaluate the appropriateness of various technologies to serve various densities of development. The imposition of development densities via zoning and other forms of land use planning is, however, solely the responsibility of local elected officials.

T-12. The draft 201 Plans were assigned low positions on the state priority list when they were originally submitted.

The reason EPA decided to prepare an EIS for the five draft 201 Plans was that the agency believed that the communities were not "getting a handle on the problem" and that significant issues and considerations had not been properly evaluated. As was stated by

EPA at the public hearings, the topics not adequately analyzed included 1) identification of water quality problems, 2) adequate evaluation of on-site and small community wastewater management technologies, 3) financial burden and management capabilities, 4) nonpoint source runoff, 5) groundwater impacts, and 6) impacts to environmentally sensitive areas. The purpose of the EIS is to provide 201 grant applicants with a series of tools to update their plans and assure the selection of an alternative which the state can certify and place on the priority list.

T-13. The EIS states that nonpoint, not point, source pollution from the mainland is the problem. See W-24.

T-14. The N.C. Shellfish Sanitation Office has an ongoing monitoring program. The coastline is divided into segments. Every fourth year a segment is subject to a comprehensive survey, and spot checks are undertaken every second year.

T-15. See W-7. Most states require 2.0 to 4.0 feet of unsaturated soil. Also see EPA On-Site Design Manual's similar criteria.

T-16. See W-9. Operation and maintenance costs for good quality sewage effluent pumps have been low to date. Proper placement and use of corrosion resistant materials have minimized repairs. Correct selection and location of pump switches can greatly minimize potential pump burnout. Short and infrequent pumping cycles have minimal electrical requirements, costing the homeowner pennies per day.

T-17. O&M of individual sewage disposal systems should remain with the homeowner. Technical assistance could be made available through the existing county health department structure regarding O&M practices and repairs to malfunctioning systems.

There could easily have been an increase in manpower requirements for services such as construction inspection and subsequent maintenance surveys of existing systems. Costs for this additional service could be borne by the individual obtaining the permit or benefitting from the services. Thus, permit fees can be adjusted accordingly to raise the necessary operating capital.

T-18. Proper siting, design, construction and maintenance of soil absorption systems should result in a system capable of producing a properly renovated effluent which, along with natural dilution, should not pose a threat to local groundwater resources and individual wells.

T-19. See W-13.

T-20. See W-15.

T-21. See W-16.

T-22. Should an ocean outfall be a component of a revised 201 Plan, a site-specific survey will likely be required by the North Carolina

Department of Environmental Management. This survey will consist of detailed engineering and environmental considerations. The purpose of such a survey will be to determine if an ocean outfall is cost-effective and environmentally sound for the specific location. Such a study has been completed for the Dare Beaches 201 Plan.

T-23. EPA agrees with this statement. Furthermore, the purpose of the EIS is to provide a series of tools for assessing appropriate technologies and management structures so that this situation is not allowed to occur.

T-24. Comment noted. See also W-43.

T-25. EPA agrees that adequate management is critical to the satisfactory installation, operation and maintenance of on-site and small community systems.

T-26. See W-27.

T-27. Comment noted.

T-28. EPA believes that the North Carolina soil absorption system regulations provide a sound basis for the regulation of these systems and need very little improvement. EPA will continue to work with state and local governments in improving the performance of these systems, however.

T-29. EPA recognizes that water supply on barrier islands is an important issue. EPA believes that the tools and procedures developed by the EIS will, when implemented, serve to decrease impacts to the quality and quantity of groundwater resources. The groundwater model described in Appendix D of the Draft EIS is an especially important tool. See also W-43.

T-30. The density issue has been raised many times in the three public hearings on the Draft EIS. See W-49, W-67, and T-23.

T-31. See T-25.

T-32. EPA has taken this suggestion under consideration. No decision has been made at the time of publication of this document.

T-33. Comment noted.

T-34. Comment noted.

T-35. See T-25.

T-36. An ocean outfall site-specific survey for the Dare County 201 Plan was required by the N.C. Department of Environmental Management. Subsequently, the Carteret County 201 Plan proposed the use of an ocean outfall. The DEM and EPA decided that a decision on a survey for the Carteret plan should await the outcome of the Dare County survey. That survey is now complete; however, Pine Knoll Shores has elected not to participate in the Carteret County 201 Plan. Should a revised Carteret 201 Plan again recommend an ocean outfall, it is likely that a site-specific survey will be required to determine if it is cost-effective and environmentally acceptable for the Carteret County location.

T-37. EPA agrees that on-site systems are sound and proven technologies. However, they can fail when installed in unsuitable locations.

T-38. See T-25.

T-39. The EIS Strategy allows for the consideration of all viable wastewater management alternatives, including ocean outfalls.

T-40. Ocean outfalls are not prohibited on the coast of North Carolina. Any proposed ocean outfall must undergo a feasibility study such as that completed for the Dare Beaches 201 Plan.

T-41. Comment noted.

T-42. Comment noted.

T-43. See W-27 and W-42.

T-44. See T-11.

T-45. On the contrary; the purpose of the EIS is to broaden communities' options by requiring, among other things, an in-depth assessment of the suitability of local conditions for the selection of on-site and small community systems as an alternative to the proposed large, costly regional plants.

T-46. The implementation of the EIS Strategy would support the carrying out of the proposed draft 201 Plans only in those instances where the use of the EIS procedures demonstrated that the central or regional approach was justified environmentally and financially.

T-47. See T-25.

T-48. It is not possible to generalize. Cost studies must be undertaken on a case-by-case basis and be based on life cycle costing techniques.

T-49. The issue of limiting the number of wastewater treatment plants that an operator could supervise was brought to the Certification Commission, and a public hearing was held to address that issue and several other alterations to the rules. In May 1983, the Commission decided not to impose a limit since it felt that the problem was not sufficiently widespread to justify action. This was the first time the issue has been raised, and it is not expected to be raised again in the near future (Campbell 1983).

T-50. According to current North Carolina regulations, the Division of Environmental Management regulates all systems with surface discharges plus public systems with subsurface discharges. The Division of Health Services regulates private systems with subsurface discharges. This information is found in Article 13E of Chapter 130 of the General Statutes of North Carolina.

CHAPTER IV. COORDINATION LIST (continued)

N. C. Department of Agriculture
    Office of Statistics
N. C. Department of Commerce
    Bureau of Statistics
    Division of Commercial Sports Fisheries
N. C. Department of Administration
    Marine Resources Centers
Office of State Management and Budget
    State Clearinghouse
State Historic Preservation Officer
State Archeologist
State Geologist
North Carolina State University Agricultural Extension Service
Duke Marine Laboratory, Beaufort
East Carolina University Institute for Coastal and Marine Resources

Regional and Local

Brunswick County Health Department

Brunswick County Planning Department

Onslow County Planning Department

Carteret County Planning Department

Dare County Health Department

Municipal Governments:
    Sunset Beach
    Holden Beach
    Yaupon Beach
    Surf City
    Atlantic Beach
    Nags Head
    Topsail Beach
    Ocean Isle Beach
    Long Beach
    Southport
    Pine Knoll Shores
    Manteo
    Kill Devil Hills

CHAPTER IV. COORDINATION LIST

Federal Government

Cooperating Agencies:

U. S. Army Corps of Engineers
  South Atlantic Division, Atlanta, Georgia
  Wilmington District, Wilmington, North Carolina

Federal Emergency Management Agency
  Insurance and Mitigation Division, Atlanta, Georgia

Other

Centers for Disease Control, Atlanta, Georgia

U. S. Soil Conservation Service
  State Conservationist, Raleigh, North Carolina

U. S. Department of Commerce
  National Marine Fisheries Service

U. S. Department of Interior
  National Park Service
    Cape Hatteras National Seashore
    Cape Lookout National Seashore

U. S. Fish and Wildlife Service
  Pea Island National Wildlife Refuge

State Government

- N. C. Department of Natural Resources and Community Development
  - Division of Environmental Management
    - Construction Grants
    - Groundwater Branch
    - Impact Assessment Unit
    - Office of Regulatory Relations
    - Monitoring and Technical Services Branch
  - Division of Marine Fisheries
  - Division of Parks and Recreation
  - Office of Coastal Management
  - Resource Planning and Assessment Office
  - Washington Regional Office
  - Wilmington Regional Office

- N. C. Department of Health and Human Services
  - N. C. Division of Health Services
    - Environmental Health Section
    - Water Supply Branch
    - Shellfish Sanitation Office
- N. C. Wildlife Resources Commission

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APPENDIX

Work Plan for North Carolina Barrier Islands Ground-Water Study

A-i-

WORK PLAN
FOR
NORTH CAROLINA BARRIER ISLANDS
GROUND-WATER STUDY

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IV
NEPA COMPLIANCE SECTION
345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

NOVEMBER 1983

A-i-a

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INTRODUCTION

The barrier islands are a narrow chain of islands along the coast of North Carolina (Figure 1). The islands have a total length of approximately 260 miles with about 130 miles composed of the Cape Hatteras and Cape Lookout National Seashores. Island widths are typically 2,000 feet, but vary from less than 500 feet to more than 2 miles. Altitudes range from sea level to about 30 feet and are generally less than 10 feet.

Three study areas have been selected for this study. The first study area is Kill Devil Hills on Hatteras Island. The second study area is Pine Knoll Shores-Atlantic Beach on Bogue Banks. The third study area is Surf City on Topsail Island. The location of these study areas is shown on Figure 1.

Residents in the study areas generally receive their water supply from the mainland or from deep wells on the islands. Water is distributed to individual homes using a water supply distribution network.

Some residents obtain their water supply from shallow wells. These wells withdraw water from the water-table aquifer that directly underlies the islands.

All residents on the islands use on-site septic systems to dispose of their wastewater. These septic systems are generally composed of a septic tank, a distribution box and a drain field. The septic tank is

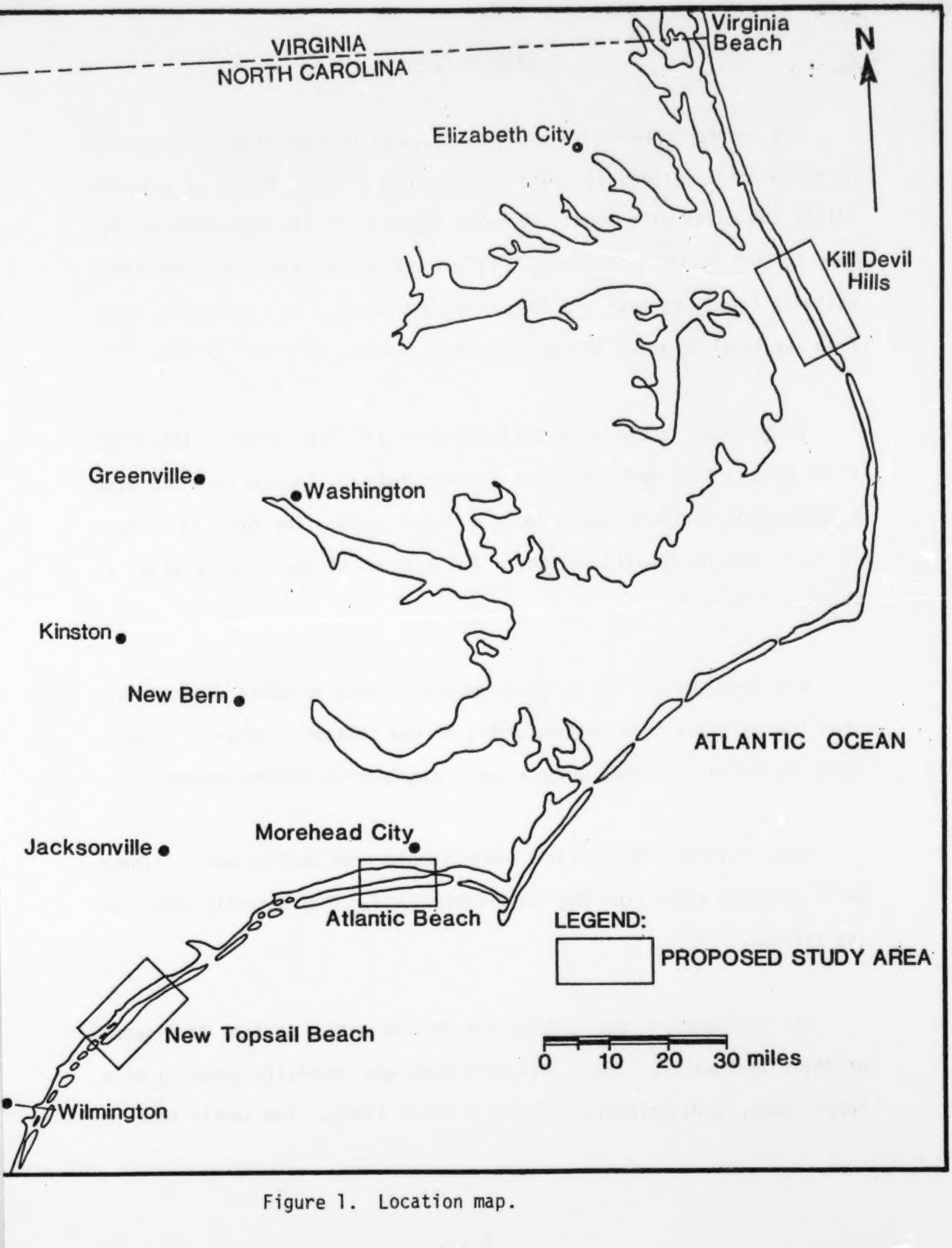
VIRGINIA
NORTH CAROLINA
Virginia Beach
N
Elizabeth City
Kill Devil Hills
Greenville
Washington
Kinston
New Bern
ATLANTIC OCEAN
Jacksonville
Morehead City
Atlantic Beach
LEGEND:
PROPOSED STUDY AREA
New Topsail Beach
0 10 20 30 miles
Wilmington

Figure 1. Location map.

used to settle solids from the wastewater. The distribution box is used to distribute water to drainage pipes in the drain field. The drain field is used to dispose of the wastewater by infiltration of the water into the ground.

A critical factor to the continued development of on-site waste disposal systems is the response of the water table to the infiltrating wastewater. This disposal practice creates a net addition of water to the water-table aquifer wherever a mainland or deep well source is used for water supply. Water-table levels will rise in response to this recharge. Water levels could rise to contact drain field trenches and possibly cause surfacing of effluent in areas where the added wastewater recharge becomes excessive.

Wastewater management planning requires that those involved in the management process have simple and reliable procedures for estimating water level and water quality changes that would be caused by increased development on the Islands.

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HYDROLOGIC DESCRIPTION OF STUDY AREAS

The ground-water reservoir under the barrier islands generally consists of a sandy water-table aquifer underlain by semi-confined and confined aquifers. The semi-confined and confined aquifers are separated from the water-table aquifer by confining beds of silt and clay. These beds can occur at depths between 10 and 50 feet below land surface (Winner, 1975).

Fresh ground water beneath the barrier islands occurs as a lens-shaped mass floating on top of denser salt water. The shape and extent of this freshwater lens is governed by the height of the water table above mean sea level, the presence of silt and clay confining beds, the effects of tides and periodic storm wash (Winner, 1978). A mixing zone occurs at the boundary between the fresh and salty water due to fresh water circulation and tides.

The water-table aquifer in the Kill Devil Hills area is approximately 50 feet thick (Peek et al. 1972). This aquifer consists of sand with some shells and some thin interbedded clays and silty sands. The base of the water-table aquifer is a layer of clay and interbedded clay and sand that ranges in thickness from about 35 feet to more than 100 feet.

The water-table aquifer in the Atlantic Beach area is probably not more than 100 feet thick. Winner (1978) describes the water-table aquifer in the area of Cape Lookout to have a maximum thickness of 100 feet with locally occurring confining beds of silt and clay. Cape Lookout is located on Harpers Island approximately 12 miles east of Atlantic Beach. Also, Winner (1978) reports that semi-consolidated sandy limestone occurs at a depth less than 100 feet in the vicinity of Moorehead City located about one mile north of Atlantic Beach.

Deeper freshwater aquifers underlie the water-table aquifer at both Kill Devil Hills and Atlantic Beach. Peek et al. (1972) reports the presence of a Principal Aquifer and a Lower Aquifer at Kill Devil Hills. The Principal Aquifer underlies the water-table aquifer and is separated from it by clayey confining beds. The Lower Aquifer underlies the Principal Aquifer. These aquifers are also separated by clayey confining beds. Wells in the Atlantic Beach area are generally completed in Tertiary age limestone at a depth of about 200 feet (LaGrand, 1960). Some of these wells flowed in 1960.

The water-table aquifer at Surf City is 50 to 85 feet thick (LaGrand, 1960; Layman, 1965). This aquifer consists of sand with some clay lenses. The base of this aquifer is the Castle Hayne limstone.

The water-table aquifer at Surf City is underlain by a limestone aquifer and a deep sandstone aquifer (Layman, 1965). The limestone aquifer consists of highly porous limestone and has a thickness of approximately 70 feet. Water in the limestone is under artesian pressure. The deep sand aquifer consists of interbedded sands and clays and has a thickness that probably exceeds 190 feet.

APPROACH

The work to be performed is divided into ten tasks. Task 1 is finalizing the transect and well locations for each study area. Task 2 is installation of monitoring wells and monitoring equipment. Task 3 is data collection. Task 4 is determining land and water use in the study areas. Task 5 is geologic characterization of the study areas. Task 6 is hydrologic characterization of the study areas. Task 7 is characterization of ground-water quality in the study areas. Task 8 is demonstrating the use of a simple ground-water model. Task 9 is report preparation. Task 10 is removal of equipment and abandonment of wells. Each of these tasks is described in the following pages.

TASK 1. FINALIZE TRANSECT AND WELL LOCATIONS

Hydrologic data will be collected along transect lines to be located in each of the study areas. A minimum of three transects will be selected in each study area. One transect will be selected in an area of low population density. A second transect will be selected in an area of medium population density. A third transect will be selected in an area of high population density.

Tentative transect and well locations were selected in each of the study areas during a reconnaissance visit to the areas in October. Each transect line was located with the idea that well locations could be placed within road right-of-way lines where practical. In this manner, obtaining permission to drill at sites along a transect will be simplified.

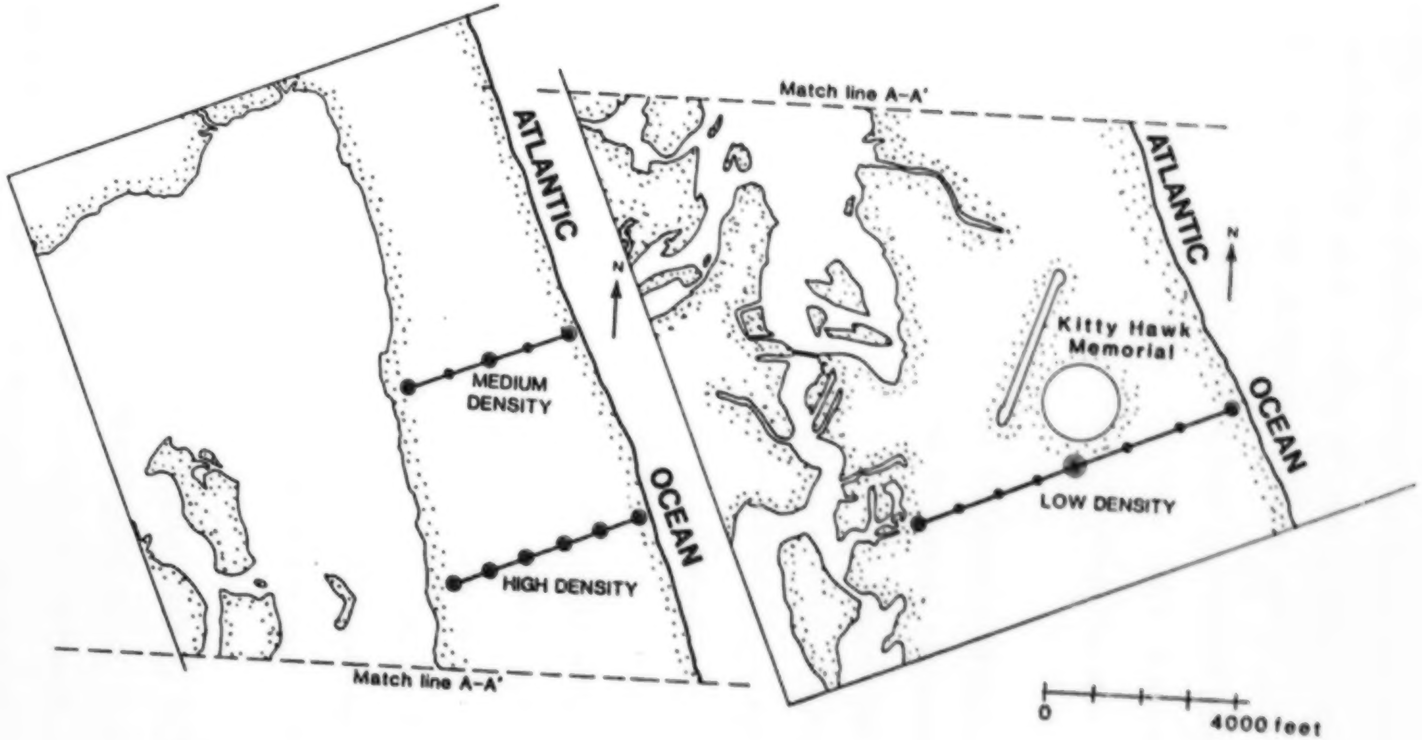
Transect lines and well locations will be finalized when the project begins. Recent areal photographs which will be supplied to the project by the EPA will aid in determining the final locations. Permission to drill wells and install monitoring equipment will then be obtained from the appropriate authorities or individuals, including the North Carolina Department of Water Resources.

Subtask 1.1 Transect and Well Locations for Kill Devil Hills Area

Three transect lines are located in the Kill Devil Hills area. A transect line in an area of low density development is located adjacent to the south end of the Kitty Hawk Memorial along Collington Road. Eight well location sites are identified along this transect. A medium population density transect is located along Chowan Avenue. Five well location sites are identified along this transect. A high population density transect is located along 5th Avenue. Six well location sites are identified along this transect. The locations of transect lines and well sites in the Kill Devil Hills area are shown on Figure 2.

Subtask 1.2 Transect and Well Locations for Atlantic Beach Area

Four transect lines are located in the Pine Knoll Shores-Atlantic Beach area. A transect line in an area of low population density is located along Pine Knoll Boulevard in Pine Knoll Shores. Three well location sites are identified along this transect. A medium population density transect is located along Willow Road in Pine Knoll Shores. Five well location sites are identified along this transect. A high population density transect that is representative of single family residences


Match line A-A'
ATLANTIC
OCEAN
N
MEDIUM DENSITY
HIGH DENSITY
Match line A-A'
ATLANTIC
OCEAN
N
Kitty Hawk Memorial
LOW DENSITY
0
4000 feet

LEGEND:

- Transect line
- • Monitoring well site
- ● Monitoring well site with multiple wells
- ◉ Monitoring well site that includes well with automatic water-level recorder.

Figure 2. Transect and well locations in Kill Devil Kills.

is located between Greenville Avenue and Wilson Avenue in Atlantic Beach. A high population density transect that includes a large multiple family residence is located along Dunes Avenue in Atlantic Beach. Three well location sites are identified along each of the high density transects. The locations of transect lines and well sites in the Pine Knoll Shores-Atlantic Beach area are shown on Figure 3.

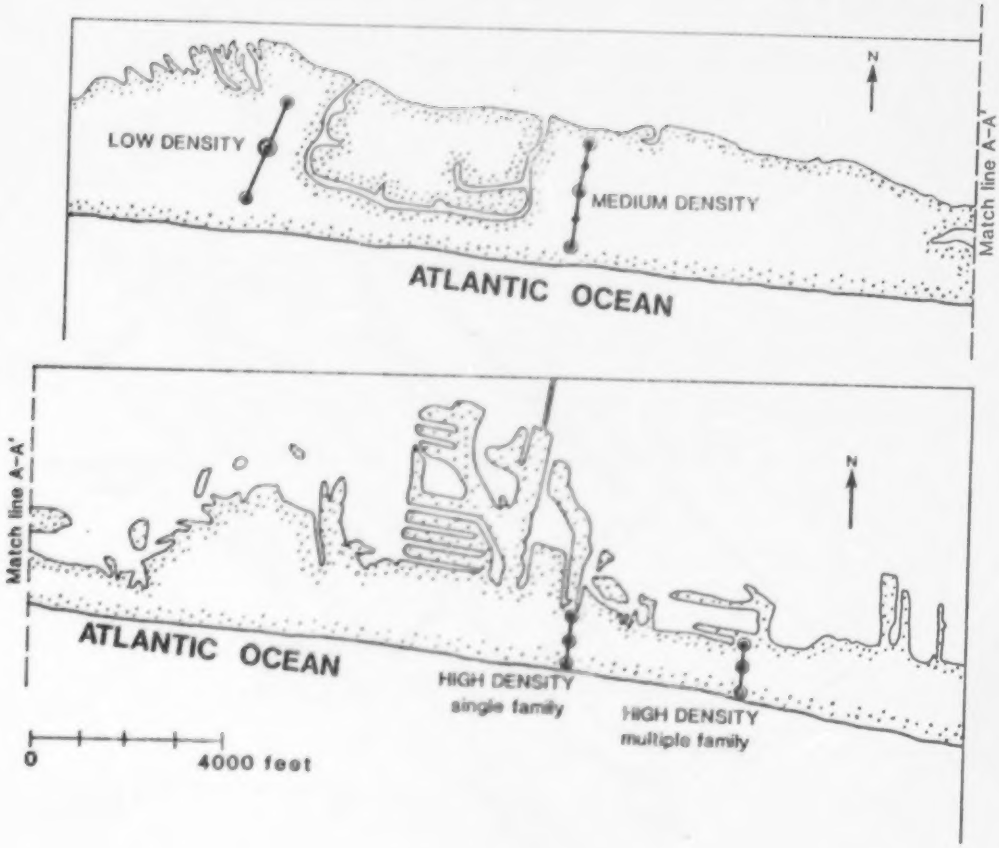
Subtask 1.3 Transect and Well Locations for Surf City Area

Four transect lines are located in the Surf City area. A transect line in an area of low population density is located between Mecklenburg Avenue and Carven Avenue. Three well location sites are identified along this transect. A medium population density transect is located between Neptune Avenue and Pender Avenue. Three well location sites are identified along this transect. A high population density transect that is representative of trailer park development is located between Stevens Street and Mecklenburg Street. A high population density area that represented a mix of homes and commercial businesses is located along Goldsboro Avenue. Three well location sites are identified along each of the high density transects. The locations of the transect lines and well sites in the Surf City area are shown on Figure 4.

TASK 2. INSTALLATION OF MONITORING WELLS AND OTHER MONITORING EQUIPMENT

Subtask 2.1 Obtain Drilling Subcontractors

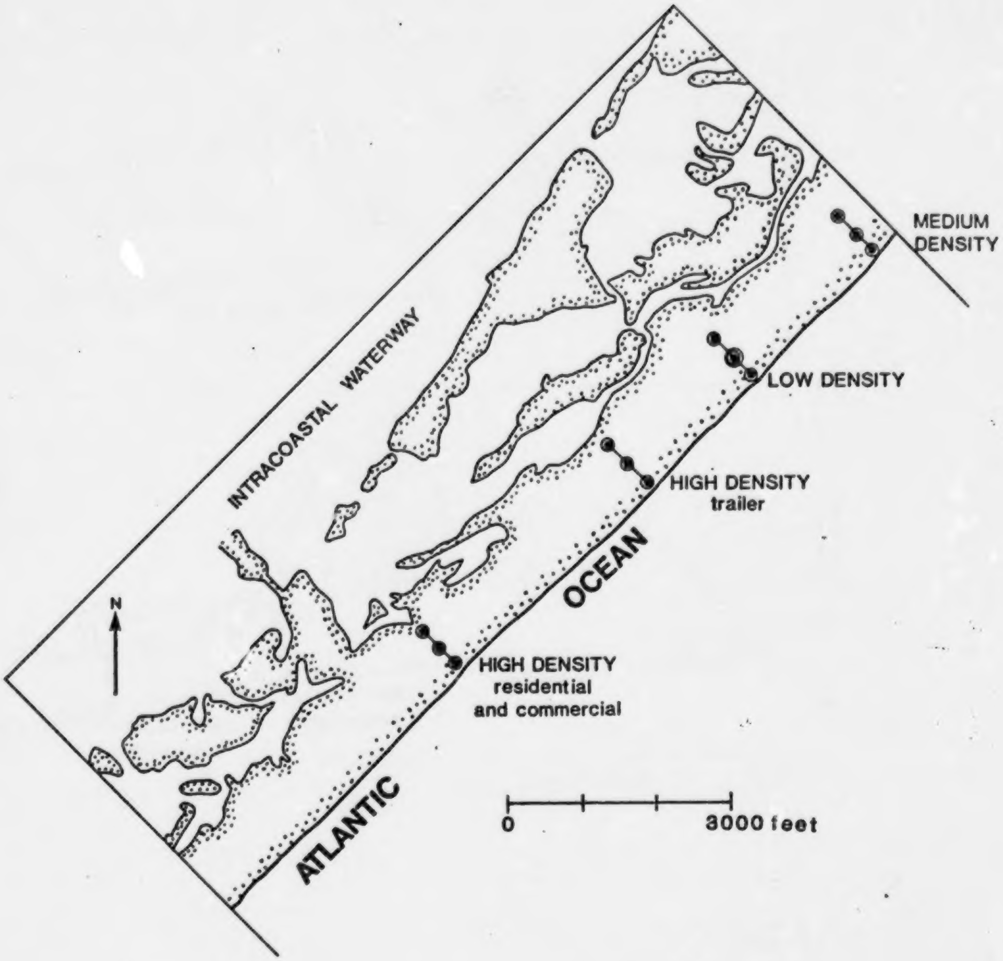
Drilling subcontractors for installing the monitoring wells will be chosen by competitive bidding. It is anticipated that a separate contact will be awarded for each study area. A bid package for the drilling work will be prepared during the first week of the project.


N
LOW DENSITY
MEDIUM DENSITY
Match line A–A'
ATLANTIC OCEAN
Match line A–A'
N
ATLANTIC OCEAN
HIGH DENSITY
single family
HIGH DENSITY
multiple family
0
4000 feet

LEGEND:

—— Transect line
• Monitoring well site
● Monitoring well site with multiple wells
◉ Monitoring well site that includes well with automatic water-level recorder

Figure 3. Transect and well locations in Pine Knoll Shores-Atlantic Beach.


INTRACOASTAL WATERWAY
MEDIUM DENSITY
LOW DENSITY
HIGH DENSITY trailer
HIGH DENSITY residential and commercial
N
ATLANTIC
OCEAN
0
3000 feet

LEGEND:

- ——— Transect line
- • Monitoring well site
- ● Monitoring well site with multiple wells
- ◉ Monitoring well site that includes well with automatic water-level recorder.

Figure 4. Transect and well locations in Surf City area.

Subtask 2.2 Install Monitoring Wells

Monitoring well clusters will be installed at all monitoring well sites along transects located in high density population areas. Three or four monitoring wells will be completed at each cluster. One monitoring well will be completed near the water-table surface. A second monitoring well will be completed midway between the water-table surface and the top of clayey confining beds underlying the water-table aquifer. A third monitoring well will be completed immediately above the top of the confining beds. In the absence of clayey confining beds, one monitoring well will be completed immediately above the limestone bedrock surface and an additional monitoring well will be completed approximately 25 feet into the limestone bedrock.

Three monitoring well clusters will be installed at monitoring well sites along transects located in medium and low density population areas. One cluster will be located close to the ocean. Another cluster will be located close to the bay. The third cluster will be located near the mid-point of the transect. The proposed locations for monitoring well clusters are shown on Figures 2, 3 and 4.

The monitoring well clusters will serve multiple purposes. Water-quality data collected from these monitoring wells will aid in identifying vertical variations in water quality along a transect. These data will also aid in identifying the quality of water discharging to the ocean and to the bay. Water-level data collected from these wells will aid in identifying ground-water flow paths and in monitoring the position of the water table.

Single monitoring wells will be located at monitoring well sites that do not have a cluster of monitoring wells. The monitoring well at a single well site will consist of a shallow well to monitor the position of the water table.

One deep monitoring well may be drilled in each study area. This well will be drilled to determine the depth to the fresh water-salt water interface and aid in defining the hydrogeology in the area. The well will be drilled if near-surface confining beds are not identified in the water-table aquifer in the study area. The well will be terminated before reaching the fresh water-salt water interface if it becomes apparent during drilling that confined fresh-water aquifers that receive water from sources on the mainland are being encounter.

Borings for monitoring wells will be advanced using a hollow stem auger or other approved method. A geologic log of each borehole will be recorded by an ABI* geologist who will monitor the drilling. Split-spoon samples will be taken approximately every five feet during augering of the deepest boring. This sampling will be done in accordance with procedures outlined in ASTM D 1586-74. The samples will be used to aid in defining the lithology at the site. Undisturbed samples may be collected for laboratory analyses of permeability and grain size to aid in defining the hydrogeology at the site. These samples will be collected in accordance with procedures outlined in ASTM D 1587-74. Coring may be done to advance borings that encounter refusal. Coring will be performed in accordance with ASTM D 2113-70.

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*EPA contractor

Most borings will be completed as two-inch diameter monitoring wells. PVC pipe and screen will be used for constructing these wells. The annulus between the well screen and the borehole will have a minimum 1.5-inch thick gravel pack. The remainder of the annulus will be filled with a cement or bentonite grout mixture. A protective cap and cover will be placed over the well at the surface.

One shallow boring in each study area will be completed as either a four-or-six-inch diameter monitoring well. An automatic recorder for measuring ground-water levels will be installed on each of these wells. These wells will probably be located in the center of the low population density transect (Figures 2,3 and 4). The wells will be constructed using PVC pipe and screen.

Each monitoring well will be developed by pumping or bailing. Water will be removed from a well until the well produces sediment-free water.

Subtask 2.3 Install Tidal Gages

One tidal gage will be established in the bay and one tidal gage will be established in the ocean for each study area. These gages will consist of a reference point with a known elevation from which the distance to water can be measured. The tidal gage for the bay will be established on a bridge or a pier. The tidal gage for the ocean will be established on the nearest fishing pier. A stilling well consisting of two-inch diameter PVC pipe may be installed on the fishing pier to aid in more accurately measuring ocean water levels.

Subtask 2.4 Install Precipitation Gages

A precipitation gage will be established in each study area. The precipitation gages will be non-recording and will need to be read daily. An observer will be hired in each study area to read and record daily precipitation.

Subtask 2.5 Elevation Survey

A professional surveyor will determine the land surface profile along each transect, elevations of the top of casing for each well and the elevation for each tidal gage reference point. This data will be needed in order to reference water levels and land surface to a common datum. The land surface profile will be determined to the nearest foot of elevation. The casing elevations and tidal gage elevations will be determined to an accuracy of 0.02 feet.

The surveyor will be required to establish bench marks in the vicinity of each well monitoring site and each tidal gage. These bench marks will have a known elevation to within 0.02 feet. The bench marks will provide a reference elevation for replacing well casings that may become damaged and tidal gages that may become damaged or destroyed.

Subtask 2.6 Install Water-Level Recorders

An automatic water-level recorder will be installed in one shallow monitoring well in each study area. This monitoring well will have been finished as either a four- or six-inch well in order to accommodate a recorder float. The recorder will be capable of recording water levels for up to 30 days. It will also be capable of recording water levels to within 0.01 foot. The recorder will be protected by a metal box which will be placed over the recorder and anchored to the well casing.

TASK 3. DATA COLLECTION

Data collection efforts include the collection of ground-water level data, ground-water quality data, aquifer-test data, and ocean and bay water-level data. Ground-water level data and ocean and bay water-level data will be collected quarterly. Ground-water quality data will also be collected quarterly. Additional water-level and water-quality data will be collected during short-intensive data collection periods. Aquifer-test data will be collected once at selected monitoring wells.

Subtask 3.1 Measure Ground-Water Levels

Water-level elevations in monitoring wells will be determined from depth to water measurements. The water-level elevation in a well is equal to the elevation of the reference point on the top of the casing from which the depth to water measurement is made minus the measured depth to water. Depth to water measurements will be made using a steel tape. Water levels will be measured in all wells coincidentally with the collection of ground-water quality data.

Water levels will be measured in each of the wells in each high population density transect over a 24-hour period. This will be done twice during the course of the study. One set of measurements will be made during the winter when the effects of ground-water evapotranspiration are minimal. The second set of measurements will be made during the summer when the effects of ground-water evapotranspiration are greatest. Additionally, water levels will be measured along one of the high population density transect during and following a major storm event if practical. Water-level data will be collected after such a storm event until a recession trend in water levels is well defined.

Subtask 3.2 Measure Ground-water Quality

Water quality will be monitored quarterly along the high population density transect in each area. The field parameters that will be monitored include pH, temperature and specific conductance. Water samples will be taken for laboratory determination of fecal coliform bacteria, nitrate/nitrite, ammonia, chloride, sodium, total dissolved solids, orthophosphate, MBAS, alkalinity and hardness. Water sampling will be done in accordance with procedures outlined in ABI's quality assurance manual (Appendix A*).

Styrofoam ice chests will be used for shipping samples. Sample bottles will be inventoried, then packed upright in the chests and covered with ice. The chests will be sealed with filament tape. One copy of an inventory sheet for each chest will be retained by the field personnel, one copy will be sent to the quality control manager at ABI and one copy will be sent with the samples.

Maximum holding times recommended by Standard Methods, 15th Edition for preserved samples will be followed. This will be done by taking samples at the end of each day to either Norfolk, Virginia, New Bern, North Carolina or Wilmington, North Carolina, for air transport to Atlanta, Georgia. The scheduled service to Atlanta from each of the three airports in the project area is adequate to meet the required time constraints.

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*Not included here.

Sample analyses for all parameters except fecal coliform bacteria will be performed in ABI's Atlanta office. Analysis for fecal coliform bacteria will be done by ABI in the field using the membrane filtration technique. Laboratory analysis procedures that will be followed are outlined in Table 1.

Water quality will be sampled along one of the high population density transects immediately following a major storm event if practical. It is envisioned that one set of water quality samples will be collected. This data collection effort will proceed coincidentally with the collection of water-level data for a storm event.

Subtask 3.3 Determine Water-Table Aquifer Properties

The hydraulic conductivity for the water-table aquifer will be computed by simple tests performed in the field. Slug tests or bailer tests will be performed in selected monitoring wells. Generally, a known volume of water is suddenly removed from the well in a slug test and recovery of the water level in the well is measured at repeated, closely spaced intervals. The bailer method requires a single measurement of residual drawdown in the well after the well has been bailed a given number of times at closely spaced intervals.

TABLE 1

WATER QUALITY ANALYSIS METHODS

Analysis	Method	Reference
N-NH_3	1) Dionex Ion Chromatograph 2) (350.1) Colorimetric, Automated phenate Storet No. 00610	EPA-600/4-79-020
N-NO_3/NO_2	1) Dionex Ion Chromatograph 2) (353.2) Colorimetric, Automated, Cadmium Reduction Storet No. 00630	EPA-600/4-79-020
Chloride	1) Dionex Ion Chromatograph 2) (325.2) Colorimetric, Automated Ferricyanide Storet No. 00940	EPA-600/4-79-020
P-PO_4 (orthophosphate)	1) Dionex Ion Chromatograph 2) (365.1) Colorimetric, Automated, Block Digester Storet No. 70507	EPA-600/4-79-020
MBAS	(425.1) Colorimetric Storet No. 38260	EPA-600/4-79-020
Sodium (total)	1) (273.1) Atomic Absorption Storet No. 00929	EPA-600/4-79-020
Total Dissolved Solids	1) (160.1) Gravimetric, Dried at 180°C Storet No. 70300	EPA-600/4-79-020
Alkalinity	1) (310.2) Colorimetric, Automated, Methyl Orange Storet No. 00410	EPA-600/4-79-020
Hardness, Total (mg/l as $CaCO_3$)	1) (130.1) Colorimetric, Automated EDTA Storet No. 00900	EPA-600/4-79-020

*The Dionex ionic chromatograph will be the primary method used for those analyses where listed.

Both methods require that the static water level in the well be measured prior to testing. These tests will be run as soon as practical after the monitoring well installation program is completed.

Subtask 3.4 Measure Ocean and Bay Water Levels

Water-level elevations in the ocean and bay will be determined from depth to water measurements. The water level is equal to the elevation of the reference point from which the measurement is made minus the measured distance to water. Distance to water measurements will be made using a steel tape. This data will be collected coincidentally with ground-water level and ground-water quality data.

Additional tidal data will be collected during intensive ground-water level and ground-water quality data collection to support these efforts.

TASK 4. LAND AND WATER USE INVENTORY

A land use inventory will be conducted at the time of well placement. This inventory will identify all types of land use within approximately 200 feet to either side of the transects. Particular emphasis will be placed upon identifying areas which may add to or detract from localized aquifer recharge. These areas will include water bodies such as ponds or drainage ditches and covered areas such as building foundations, parking lots and other paved or cemented areas.

Following the inventory, the information obtained will be plotted on topographical maps of the transect areas. This will enable more accurate determination of ground-water recharge from precipitation within the immediate vicinity of the transects.

Wastewater discharge will be determined within 200 feet to either side of all transects. Usage will be determined on a monthly basis from utility records or by an on-site survey where needed.

TASK 5. GEOLOGIC CHARACTERIZATION OF STUDY AREA

The geology at each transect will be characaterized based on interpretation of geologic logs for the borings along the transects. Geologic cross-sections will be drawn along each transect that depicts the lithology at the transect. Variations in lithology will aid in understanding the hydrogeology along the transect.

TASK 6. HYDROLOGIC CHARACTERIZATION OF STUDY AREAS

Subtask 6.1 Describe General Hydrogeology Along Transects

The hydrogeology along each transect will be characterized based on the results of the geologic characterization and water-level measurements made in monitoring wells along the transects. Cross sections will be drawn along transects for selected time periods that shows the position of the water table, vertical variations in water levels and vertical variations in chloride content of the water. Variations in water levels and chloride content of the water will be examined relative to variations in lithology. Variations in water levels through time and the general relationship between precipitation and water levels will be described using hydrographs for selected wells.

Subtask 6.2 Describe the Influence of Tides and Evapotranspiration on Water Levels

The influence of tidal fluctuations and evapotranspiration on the position of the water table will be examined through in-depth studies of water-level fluctuations. Water-level data collected from monitoring wells with recording gages will provide the basis of information for this study. The effects of tidal flucuations will be estimated from water-level records for the winter months when evapotranspiration losses are minimal. The effects of evapotranspiration will be estimated from water-level records for the summer months when evapotranspiration is greatest. Water-level data collected during the intensive studies will aid in evaluating the effects of evapotranspiration on the water table.

Subtask 6.3 Determine Percolation to the Water Table

Monthly percolation to the water table will be determined from the equation:

$$PERC = I + R - S - ET$$

where: PERC = percolation to the water table, in inches;
I = infiltration from precipitation, in inches;
R = recharge from wastewater, in inches;
S = change in soil moisture storage, in inches; and
ET = evapotranspiration.

Monthly infiltration will be assumed to be equal to monthly precipitation. Monthly precipitation will be measured as described in Task 2. Monthly recharge from wastewater will be measured as described in Task 4. Monthly soil moisture changes and monthly evapotranspiration will be computed using methods outlined in Appendix B.* Soil moisture changes in this method are based on monthly changes in infiltration and potential evapotranspiration. Monthly evapotranspiration is based on monthly infiltration rates, monthly potential evapotranspiration and computed changes in monthly soil moisture.

The accuracy of the method used to compute soil moisture changes and evapotranspiration will be checked during the course of the study. Water-level data collected during the field studies will be used to estimate evapotranspiration losses for comparison with computed losses.

Subtask 6.4 Describe Ground-water Flow Directions and Flow Rates

Ground-water flow directions will be described from geologic cross-sections along transects showing the water table configuration and vertical variations in hydraulic heads. Equal potential lines and flow lines will be constructed along these cross-sections to define flow nets and directions of ground-water flow.

Ground-water flow times and flow rates will be computed for the water-table aquifer based on the results of aquifer testing and analyses of ground-water flow directions. Flow velocities along cross sections will be computed based on the hydraulic characteristics of the aquifer and hydraulic gradients in the aquifer. Flow times along cross-sections will be estimated based on flow velocities and the length of flow lines. Flow rates along cross-sections will be estimated based on the hydraulic characteristics of the aquifer and the results of flow-net analyses.

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*Not included here.

TASK 7. GROUND-WATER QUALITY CHARACTERIZATION OF STUDY AREAS

Water quality sampling will be used to determine variations in ground-water quality. The results from quarterly sampling will be used to describe seasonal variations in water quality caused by variations in domestic wastewater disposal. The results from sampling along one of the high density transects after a major storm will be used to describe the impact of natural percolation on water quality.

Subtask 7.1 Describe General Ground-Water Quality Along Transects

The water quality along each high density transect will be characterized based on the results of water sampling and analysis. Cross sections will be drawn along transects that shows the position of the water table and variations in the water-quality parameters that are being measured. Variations in water quality will be examined relative to variations in land use, specific sources of wastewater discharge and lithology.

Subtask 7.2 Evaluate Seasonal and Meteorological Effects on Ground-Water Quality

Temporal variations in water quality along transects will be investigated. Changes in water quality along transects will be compared with changes in recharge from wastewater disposal and infiltration from precipitation.

Subtask 7.3 Evaluate Impact on Ground-Water Quality for Various Types of Residences

High density population transects were chosen to represent single family housing, trailers, and multiple family housing. The impacts of wastewater disposal from each of these types of residences on ground-water quality will be evaluated by comparing wastewater discharge quantities and water quality along transects.

TASK 8. EVALUATE GROUND-WATER MODELS

The simplified ground-water model developed by Fetter (1972) will be evaluated for its applicability to estimate changes in water-table elevations on the barrier islands that result from changes in percolation. The equation used for these computations is:

$$h^2 = \frac{W(a^2-x^2)}{41K}$$

where: W = percolation to the water table, in feet per day;

h = elevation of water-table, in feet mean sea level;

a = half-width of the island, in feet;

x = distance from center of island to point at which it is required, in feet;

K = hydraulic conductivity, in feet per day.

The model will be evaluated by comparing measured water levels along transects for selected periods with computed water levels for the same periods. Water-table elevations along transects will be known at regular intervals from water-level measurements. These elevations will be compared with those computed using the model and average percolation along the transects for the interval between measurements. Also, changes in average percolation between intervals will be used to compute water-table elevations at the end of the intervals.

The principle of superposition will be used for computing water levels based on changes in percolation. This principle allows solutions to an equation to be added and subtracted so long as a linear relationship exists between the independent and dependent variables in the equation. In Fetter's equation, the independent variable is percolation (W) and the dependent variable is water-table elevation (h). A linear relationship exists between W and h^2 in the equation. Therefore, solutions for h^2 must be added or subtracted before solving for h over the time intervals.

The influence of tidal fluctuations on water-table elevations will be identified during the study. These effects will be removed from measured water-table elevations prior to using these elevations in the model evaluation process.

An alternate ground-water model that will be evaluated is derived from data reported by Winner (1975). Winner observed a relationship between change in water-table elevation and change in depth to the fresh water-salt water interface that departed from an ideal constant relationship. This relationship, when put in an equation format similar to the format of Fetters' equation is:

$$h^2 = \frac{W(a^2-x^2)}{K(1+12.3h^{.43})}$$

The fresh water-salt water interface in Winner's relationship is defined as the point where the chloride content of the water is 250 milligrams per liter.

This alternate model will be evaluated in a manner similar to the approach used to evaluate Fetters' model where applicable. Measured water levels along transects for selected periods will be compared with computed water levels for the same periods. Water levels cannot be computed based on changes in percolation because there is not a linear relationship between water-table elevation and percolation.

TASK 9. REPORT PREPARATION

A report will be prepared that describes the work that has been done and the conclusions that were reached. The report will include:

- An introductory section that gives background information about the study, discusses the objectives and scope of the investigation and describes the location and physical setting for the study;
- A description of field data collection activities performed during the study;

- A description of the geological and hydrological characteristics of the study areas;
- An analysis of the applicability of simplified ground-water models for estimating water-level changes caused by percolation;
- An analysis of the impacts of on-site wastewater disposal systems on ground-water quality;
- A summary of findings;
- Recommendations; and
- Appendices that contain supporting data.

TASK 10. REMOVE EQUIPMENT AND ABANDON WELLS

Monitoring equipment will be removed and monitoring wells will be abandoned at the completion of the project. Monitoring wells will be abandoned in conformance with procedures specified by the North Carolina Department of Water Resources for the abandonment of temporary wells. Generally, this procedure includes finishing the well below grade level and backfilling the well with a cement grout.